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CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICES—

Eleventh Annual Meeting of the Western Gas Association..... 205

EDITORIALS—

The Result at Sandusky..... 205

Briefly Told..... 206

The Seventh Annual Meeting of the Guild of Gas Managers—The Indianapolis Gas Agitation.

Special English Correspondence..... 207

Reporting Progress—An Automatic Gas Meter—Why People do not Use Gas—Smoke and Fog.

*Tar Firing at the Poughkeepsie Gas Works, by Jno. Tracy..... 208

*The Lindsley Anti-Sealing Dip-Pipe and Sealing Cup..... 209

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 209

Lighting Hints from Newark, Ohio—Charlottesville (Va.) Wakes Up—Natural Gas in the Indiana District—A Very Funny Comedy—Think of It—Pottsville (Pa.) in Despair—Death of Dr. W. H. Ryder—A Sample Order—An Explosion at "Black Point"—The Laclede Company's New Holder—In Regard to the Equity Company's Charter—Annual Meeting Georgia Pipe Company—Death of Mrs. Krumbols—Public Lighting, Lancaster, Pa.—Annual Meeting, Middletown, Conn.—Public Lighting, Troy, N. Y.—Annual Report, Richmond, Va.—Lease of the Woodland (Cal.) Gas Works—From the Elevated City—The New Albany (Ind.) Charter Renewal—Legal Pertinacity Rewarded—And Many other "Items."

Size of Steam Pipes..... 212

IV. Annual Meeting of the Ohio Gas Light Association—Official Report..... 213

First Day, Morning Session—Roll Call—Report of Executive Committee—Applications for and Election to Membership—Reports of Secretary and Treasurer—Appointment of Special Committees—Letters of Regret—President's Address—The Use of Lima Crude Oil for Carburetting Water Gas, by Geo. H. Christian, Jr.—Discussion—The Policy of Gas Companies as to Incandescent Electric Lighting, by F. W. Day—Discussion—Afternoon Session—Methods of Inducing Non Consumers to Use Gas, by J. W. Alexander—Discussion—The First Cost of Gas Stoves and Engines, by E. C. Gwyn—Discussion—The Management of Small Works, by P. J. Wood—Discussion.

The Market for Gas Securities..... 227

[OFFICIAL NOTICE.]

Eleventh Annual Meeting of the Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION,
QUINCY, ILL., March 24, 1888.

The Eleventh Annual Meeting of the Western Gas Asssociation will be held at Chicago, Ill., on the 9th, 10th and 11th days of May.

The Grand Pacific has been chosen for our headquarters, and the finest hall ever placed at our disposal, in the immediate vicinity of the hotel, will be used for the business sessions of the Association. Hotel rates to members will be $3 per day, with baths, and rooms on the parlor floor, extra. It will be well for our members to secure their rooms in advance, which can be done by writing to the proprietor of the hotel and accompanying their request with a statement of the kind and price of rooms desired.

As stated in the last issue of the JOURNAL, your Secretary expected to present in this number a list of the papers which will be presented at our next meeting, but has thought best to defer the announcement two weeks later, as the returns are not yet quite complete. It is perfectly safe to say, however, that the plan adopted at our St. Louis meeting, of appointing a special committee with power to select and assign subjects to members and call for the writing of papers thereon, has accomplished all that its promoters claimed for it, and that there will be no dearth of literary matter for the instruction and entertainment of those in attendance.

A. W. LITTLETON, Secy.

THE RESULT AT SANDUSKY.

Our intimation that the outcome of the Sandusky convention would dishearten the pessimists was borne bravely out, and as shown from the records of all previous meetings of the Ohio Gas Light Association, we can say that the Buckeye State has every reason to continue to be satisfied of the vigorous mentality which characterizes her gas men. Perhaps it is not praising them too highly to venture the assertion that the Sloane House, which has in its time given shelter to many representative Buckeye bodies, never before contained an assemblage so bent on earnest work. The attendance might possibly have been a trifle larger, but no doubt the unsettled weather—which was simply beastly—accounted for much of this delinquency, if it can be so termed. By this time the Association is convinced that President Printz knows a thing or two about expediting the transactions of a stated gathering, his rulings being promptly delivered, while his capacity (without any obtrusiveness characterizing it either) for detail is cleverly balanced. Indeed, were the executive not of the right sort the allotted hours would have been all too short wherein to have carried out the programme arranged. The Presidential message gives a good clue to the character of the man who read it. Careful and accurate, without ostentation or wordiness, its lines reveal not only hard facts, but also suggest the way in which these may be beneficially applied.

That there was no "padding" in Secretary Butterworth's official announcement of papers to be read is proved in that 12 out of the 13 listed were presented and discussed; the single exception being the one assigned to Mr. Gwynn, of Fostoria. This, in reality, should not be considered an omission, because Mr. G., having noted the large number of contributors, and wishing to take further time with, as also to enlarge the scope of ex-

periments being conducted by him in respect of his subject, concluded to postpone their set presentation until the convention of the Western Association. Hence, what was Butterworth's nominal loss will be Littleton's actual gain. It is not our purpose to here review the papers read, reserving the right, however, to at some future time comment on those which seem now to present unusually striking features. In passing, however, we cannot refrain from congratulating the Association on some new metal that has developed from their hitherto unworked mental lodes, on the occasion of the Sandusky gathering. The paper by Mr. Herman Wilkiemeyer, of Lancaster, is a veritable gem. Indeed, on reading it over one cannot help asking himself if he has not been examining something which had been carefully prepared by a capable and well-read lawyer. If Ohio has any other like gas talent hidden away somewhere within her borders, we hope the place of its concealment will speedily be revealed. Mr. Day's paper, apart from the seeming disparity of its figures, does not advance any striking argument in favor of the efficiency or value or economy of incandescent electric lighting; and although the undertone to the discussion apparently sounded in favor of the investment by gas companies in plants for the supply of electricity—President Printz was outspoken in favor of the project—we are inclined to agree with Mr. Denniston, at least in the main. Perhaps in less than a score of the cities of this country *incandescent* electric supply may be profitably carried on, and simply so because those who will use it in the larger centers care naught for what it costs them, provided the service is efficient. Efficiency in this sense means the renewal of lamps at the end of 100 hours of duty, or when the filament shows a deterioration of 5 to 8 per cent. from its initial strength. A reddened wire will not answer the purpose of those who want incandescent lighting in its best estate, and who are prepared to pay any price therefor. We have in mind the case of a hotel keeper in Brooklyn, who frankly admits that the incandescent light used in certain departments of his house costs at least twice what the gas did which formerly illuminated the same rooms—the gas rate in Brooklyn is $1.60 per M., but, owing to the peculiar circumstances connected with his rooms—the height of their ceilings, the narrowness of the streets on which his building front, etc.—he finds that seeming extravagance in lighting pays; for his patrons, who insist on luxury, and are satisfied to pay for it, must be gratified. This same hotel keeper, who does not make his own home in the hotel premises, consumes gas in his domestic life, although he could have the incandescent light just as readily in this case as in the other. To be sure, incandescent electric light for domestic supply is not of as easy attainment in Brooklyn as in some other places, it being there a question between arc politicians who are "in," and incandescent politicians who would like to come in. Still, the arc company professes its willingness to supply the incandescent article to all who want it. We advise those who have not made the plunge in the incandescent direction to watch and wait. The next year or two will clear away much of the fog in which the subject is yet shrouded, and in this instance procrastination will likely be good generalship.

The arrangements for the comfort and entertainment of the members, credit for which belongs to the Sandusky Gas Light Company, were such as to insure praise; although we would submit that an extension to the culinary resources of the Sloane House kitchen might add to its effectiveness. As was suggested a fortnight ago, the opportunity to visit the Karg well at Findlay was availed of most eagerly, two cars having their seating capacity fully taxed to accommodate those who made the trip. Type and printer's ink are inadequate to the task of describing the weird beauty and impressive grandeur of the scenes witnessed at Findlay, with her wealth of gaseous wells, which is utilized to the fullest extent in all local enterprises. Natural gas gave light from the lamps, and heat for the parlor and kitchen as well. It was almost ubiquitous. In fact one of the visitors, late of Philadelphia, but now of Columbus, seemed puzzled to know whether the rich auburn sheen on the hair of a "lady-in-waiting" on one of the Findlay hotel tables was to be charged to natural gas. He is still pondering on the subject, however.

The Sandusky convention must be catalogued a success, and points the way to another pleasant time, under President Thos. Wood's direction, at Mansfield, in '89.

BRIEFLY TOLD.

THE SEVENTH ANNUAL MEETING OF THE GUILD OF GAS MANAGERS.—The Guild met in annual session on the 10th of last month—it was fortunate the gathering had not been arranged for two days later, in which untoward event some of the out-of-town members would have been obliged, provided they were able to reach the Hub at all, to spend a "quiet day or two" away from home) in their cozy quarters in Boston. As usual, the proceedings were replete with interest, and the feast of reason was suitably followed by that afterpiece which gives zest to the flow of soul. The annual election resulted in the selection of the following office bearers:

President—R. B. Taber, of New Bedford, Mass.
Vice-President—C. F. Prichard, of Lynn, Mass.
Treasurer—John Andrew, of Chelsea, Mass.
Secretary—C. S. Spaulding, of Brookline, Mass.

A pretty good list, that, even if the Bay State does seem to have monopolized about all that was open for distribution. The Guild steadily prospers in its influence for good.

THE INDIANAPOLIS GAS AGITATION.—The sage of Indianapolis is having his patience sorely tried, and even President Fletcher's unruffled exterior threatens to assume a different cast, because of the vagaries of the blowhards who, knowing, as they say, all about gas manufacture and distribution, nevertheless expose their ignorance with the presentation of every "fact" they adduce. The Indianapolis Gas Light and Coke Company proposed to make a reduction in its selling rate—there is no disguising the fact that the ruling figure was rather high; but this evidence on its part to deal fairly with the people seems to have acted as a stimulus to drive the blowhards crazy. Having aroused a "healthy public sentiment," the press importuned the Council to prepare an ordinance for acceptance by the Company; and this the Council did with a vengeance. Divested of all its trash, the ordinance sought to establish a $1 rate for gas, public lamps to be maintained for $15 per annum. President Fletcher thereupon said that any combination which would undertake to supply gas at those figures need not be at the necessity of building a plant for the purpose, as they could take the Indianapolis works at a figure to be agreed upon by arbitrators. After giving cogent reasons why such supply could not be carried on, he offered, on behalf of his Company, to accept a contract fixing the rates at $1.25 per thousand to consumers and $18.75 for public lamps, the latter to be supplied for $13.75 if the city would light and extinguish and keep in repair. The existing contract, it might be said, calls for $1.80, and $25 per annum. The Company's proposition, we understand, has been rejected, but on what grounds we are not prepared to say. To us, however, the proposition seems to be remarkably liberal. During the public discussion of the matter the Indianapolis *News* amassed a "vast array of facts," some of which were borrowed from the report of the Spooner Washington (D. C.) gas inquiry, and which are altogether even abnormally absurd, if absurdity ever is or was normal. In the first place we are told that "Mr. Jos. F. Brown, the man who made the Washington (D. C.) Company what it is to-day, says gas can be made in Indianapolis for 40 cents in the burner" (sic). Mr. Brown would evidently find no trouble in detecting the similarity in color of black and white. We are also informed that gas is sold in Baltimore at 50 cents per thousand, whereas the rate is precisely $1.50. Mr. Prichard, of Lynn, Mass., will be surprised on hearing that he shares with Yonkers, N. Y., the honor of selling gas at 50 cents; while Mr. Barret may doubt the virtue of the renewed charter of his Company when informed that two Companies in Louisville sell gas at $1. Even McCarty (the "Col." who so ably assisted Mr. Flagler to part with some of his well-earned McKeesport cash) is invoked for the good of the cause. Is it a wonder that one is inclined, through sheer disgust of the antics of the fools who make their free-handed strikes at invested capital, to advise a return to the days when the pioneer gas men made the public pay for a luxurious light! The crowning glory of the *News* man's effort, however, is found in his closing thunderbolts, which are appended: "George Shepard Page, President of the American Gas Light Association [where was Mr. Greenough, then?], in his annual address last October, said, 'The time is near at hand when it will cost nothing to put gas into the holder; and it costs very little now.' Mr. Charles H. Nettleton, at the same meeting, demonstrated that 51,000 feet of gas of all kinds can be manufactured from a ton of coal. The labor and incidentals cost 4 cents and materials 4 cents, giving a total cost of 8 cents per thousand in the holder." Little did Mr. Nettleton reck of the fame which he had gained; and President Page has our commiseration. Is it any wonder, then, that the sage of Indianapolis is disturbed, having thus to hearken to the mendacity of his fellow citizens?

ON March 23d the Circuit Court dissolved the injunction lying against the gas ordinance passed by the Xenia, Ohio, City Council last December, the opinion of the Court being that the charges of fraud and irregularity, alleged by the opponents of the contract made with the Gas Company, were not sustained. The City Solicitor, who sued out the injunction, at once gave notice of exception to the Court's last ruling. The Xenia Gas Company now sees light ahead.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, March 10, 1888.

Reporting Progress.—An Automatic Gas Meter.—Why People do not Use Gas.—Smoke and Fog.

In the course of an inaugural address delivered before the Midland Association of Gas Engineers, the President, Mr. H. Hack, gave some interesting statistics as to the progress of the gas industry during the four years ended 30th December, 1886. His authority for the information was the official Parliamentary returns, and, therefore, the particulars are compiled from a perfectly independent source. I will first select a few figures which afford some idea of the magnitude of this important industry in the United Kingdom. On Dec. 31st, 1886, the amount of capital, actually paid up, invested in gas works was about 273½ million dollars. The coal carbonized during that year was 8,658,000 tons, yielding on the average, 10,000 cubic feet of gas per ton, or an aggregate of 86,828,384 000 cubic feet of gas. Of this quantity 80,680,470,000 was duly registered and paid for, leaving a deficiency of 6,147,914,000 cubic feet, or about 7¼ per cent., as unaccounted-for gas. About 2,130,000 private consumers and 52,000 public lamps are concerned in consuming the quantity of gas above named. The average illuminating power, exclusive of the rich cannel gas supplied in Scotland, was rather more than 16.5 candles, and the average price 90 cents per thousand cubic feet.

Now let us follow what is perhaps even more interesting than the foregoing, viz., the extent of progress that has been made. The actual sale of gas during the four years has increased to the extent of 21.1 per cent., or at the rate of 5 per cent. per annum. The yield per ton and illuminating power have been slightly improved, and the unaccounted-for gas has been reduced to a small extent. The increase of capital has been very much less, in proportion, than the increase of business, being only about 6 per cent. on the sum above named. In England the price of gas has been reduced to the extent of 12 cents; viz., from 92 to 80 cents; in Scotland the reduction has been similar in amount, the average price being $1.08 in 1882, and 96 cents in 1886. In Ireland a slight increase in price has prevailed, and the present average is $1.12. The number of consumers has increased to the extent of a little more than 8 per cent., showing that the greater part of the increased sale of gas is not due to new customers, and that the average consumption per consumer has increased. The public lamps have been increased about 14.5 per cent.

Having seen that only a moderate proportion of the increased demand for gas is due to new customers, it is interesting to inquire as to the other causes which have been at work in this direction. The reductions in price have, of course, been an inducement to use more. They constitute about the best advertisement that can be given, and no doubt the announcement of lower rates has directed the attention of many consumers to the uses of gas for cooking, heating, etc. Another cause is greater enterprise on the part of the sellers. Until the commencement of the present decade many gas undertakings appeared to be indifferent as to whether they increased their business or whether they did not. The prospect of competition from oil and electricity roused them to put forth more energy, and to promote exhibitions of appliances, lectures, and other means of advertising the uses of gas; to establish show rooms where apparatus can be seen and every information obtained; and to exercise a more liberal spirit in the matter of service laying, fitting up stoves, etc. Apart from the prospect of competition, all are agreed as to the desirability of extending the consumption of gas in every possible way, so as to enable reductions in price to be made, and thus to increase the stability of the concern. Considerable activity amongst makers of gas appliances of all kinds—burners, fittings, stoves and engines—resulting in many important improvements in gas apparatus, either for lighting, cooking, heating, motive power, or technical purposes, has also been observable, to an extent that warrants one in supposing that this has been the most important cause in increasing the demand for gas.

In noting this progress it must be remembered that during the period under review gas undertakings have had to encounter trying times in the residual market. In 1882 tar was selling well—at $10 per ton of 200 gallons or so; but in 1886 its marketable value had fallen almost to vanishing point. In 1882 sulphate of ammonia was worth about $100 per ton; but in 1886 it did not realize much more than half that sum. As a consequence the receipts for residuals were certainly less to the extent of 6 cents per thousand cubic feet at the end of the period than at the beginning. This serves to render the progress above recorded, especially as regards reduction in price, more remarkable.

The idea of combining with an ordinary gas meter an automatic rental clock is rather striking. An ingenious inventor, by name, Mr. R. W. Brownhills, of Birmingham, has just introduced an automatic gas meter, based on the principle of the machines used for the automatic sale of cigarettes, chocolate, etc. This meter will not pass gas until it has been propitiated by the insertion of one penny in a slit provided for that purpose. It then delivers gas until the equivalent in value of the coin has passed through, and as this quantity is approached the light begins to dwindle and will eventually go out, unless the meter is refreshed by the supply of a second coin. The idea is to facilitate the use of gas amongst the poorer classes, by enabling them to pay as they go on. More than one penny can be put in at a time, if desired, and the corresponding quantity of gas will be delivered, so that a weekly "payment" may be made. The number of coins inserted is registered on a dial, and they are received in a locked receptacle. The collectors are provided with keys, and call to clear the box at any convenient period. Several models of the automatic meter have been shown in public, and they work efficiently. There is something pleasing about the idea of securing the money beforehand, but the system is liable to abuse in many ways. The machinery must necessarily be rather complicated and of a delicate nature, and, as such, would be liable to get out of order; and several ways in which a door for fraud would be opened will suggest themselves. Questions would be contiually arising as to whether the machine delivered a fair pennyworth, and judging from the opinions sometimes expressed respecting the ordinary make of meter they would be difficult of settlement. The price of the new make of meter does not appear to be more than that of the ordinary kind, and if it is capable of doing all that the inventor claims on its behalf it certainly is worth a trial.

Mr. Thomas Duxbury, of Darwen, has been carrying the war into the enemy's camp by making a house to house canvass amongst the non-consumers of gas in his district, with a view of ascertaining why they do not avail themselves of the advantages afforded by it. The answers are in some part of a fanciful nature, but it will be seen that many of the causes are removable by alterations in the regulations. He finds that 332 persons object to pay a deposit in advance, and 89 of this number promised to take gas at once if this reduction was removed. In 370 cases the question of fittings is an objection. Either they are out of order and the landlord will not repair them, or have never been laid on and the landlord refuses to supply them; 301 can pay for oil weekly, but cannot afford to pay a gas bill at the end of the quarter; and 512 prefer to use oil for various reasons; 161 have never tried gas, and 134 think that the gas would prove too costly; 216 persons find fault for various reasons, such as bills being too heavy, gas poor in quality or not good enough for the money. These figures are worthy of careful attention. The first cause is easily remedied, as managers of gas works find prompt collection and discount for prompt payment is preferable to exaction of deposits in advance. No doubt something may be done on the question of fittings. This includes services and meters, and it appears that the Darwen Corporation are rather behind other gas suppliers in this respect. There also appears to be room for weekly collections, which have been successfully tried in other places than Darwen. The adherents of oil can only be met by improvement in quality or reduction in price as circumstances permit, though no doubt many of them would change their views if they had an opportunity of using gas through efficient fittings and burners, and it also appears that most of the fault found with the gas was really due to defects existing on the consumer's side of the meter. Mr. Duxbury has induced his Committee to dispense with deposits, to keep services in repair up to the meter, and to fix meters gratis, though still retaining a small charge for hire. This alteration dated from the beginning of the year, and after 43 days' experience with it Mr. Duxbury was able to report an influx of 157 new consumers. The number of cases in which defective fittings have secured a bad name for the gas seems to suggest that under some circumstances it might be desirable for the suppliers of gas to undertake to keep them in repair, and at any rate, the desirability of exercising a liberal spirit in ascertaining, and, if possible, remedying the cause of an excessive gas account. It is always worth while to expend a little money in order to keep people satisfied.

A lecture was recently delivered before the Society of Arts, in London, by the Hon. Rollo Russell, in the course of which a strong case for the use of smokeless fuels, such as gas and coke, was made out. The lecturer ascribed the well known London fogs to the mechanical combination of particles of water with particles of soot evolved by the combustion of coal in domestic fireplaces and for other purposes. Having pursued this argument at length he referred to the remedy, and said that if smokeless fuel only were used a better climate and a clearer air would prevail, and that the transparency of the atmosphere over a great part of England would be notably greater if London people discontinued this "careless and almost barbaric habit of burning crude coal in open fireplaces and pitching the resulting dirt into that vital air which is naturally so power-

ful to regenerate and not to poison the world of life," and insisted on the general adoption of reasonable and economic methods of cooking and warming. He estimated that the products voided by the chimneys in London were sufficient to cover the entire area with a mantle or pall 7 feet in thickness in one hour, so that after 12 hours there would be a layer of smoky gases 84 feet in thickness over the city. He directed attention to the effect, not only on health but also on life itself, of this cloud of smoke, and estimated that $400,000 per annum were lost in wages on account of the ill-health of the working classes caused by fogs. Besides this there was the damage to animals, plants, buildings, furniture, pictures, etc., which was followed out in detail, and also shown in tabular form, the total money loss due to smoke being set down at upwards of 25 million dollars per annum. He thought that producers of smoke should be taxed. In the course of the subsequent discussion Sir Douglass Galton referred to what had actually taken place at Pittsburgh, in America. When in that town about ten years ago he experienced fogs as dense as those in London. Since then natural gas had been discovered, and had displaced solid fuels to a great extent. The result was that the atmosphere was now quite clear and pure.

Tar-Firing at the Poughkeepsie Gas Works.

By JOHN TRACY, Eng. and Supt.

Having had quite an experience (it may be taken for granted that many odd circumstances were developed in connection with the trials) in the manipulation of tar burners for firing retort benches, perhaps it will not come amiss if I relate, through the columns of the JOURNAL, how I managed to arrive at a tar-firing adjustment which was followed in the Poughkeepsie works for a continuous period of seven months. During this run neither trouble nor stoppage took place, and a steady heat was maintained under the retorts.

In the first place, how to get a white heat on retorts by the combustion of tar is not altogether what is to be desired; nor will the Poughkeepsie tar burner, of itself, accomplish any greater results, in the simple matter of securing tar heats, than may be obtained with any other form of burner. The leading principle is the same in all. No; success must be achieved from the conditions under which the tar, steam and air are consumed. Once the proper regulation of the mixture is secured, the heating will go on satisfactorily; and it is beyond question that you can then depend on getting high heats—in fact, if the burner is not closely watched, the danger to be thought of is that they will become excessive.

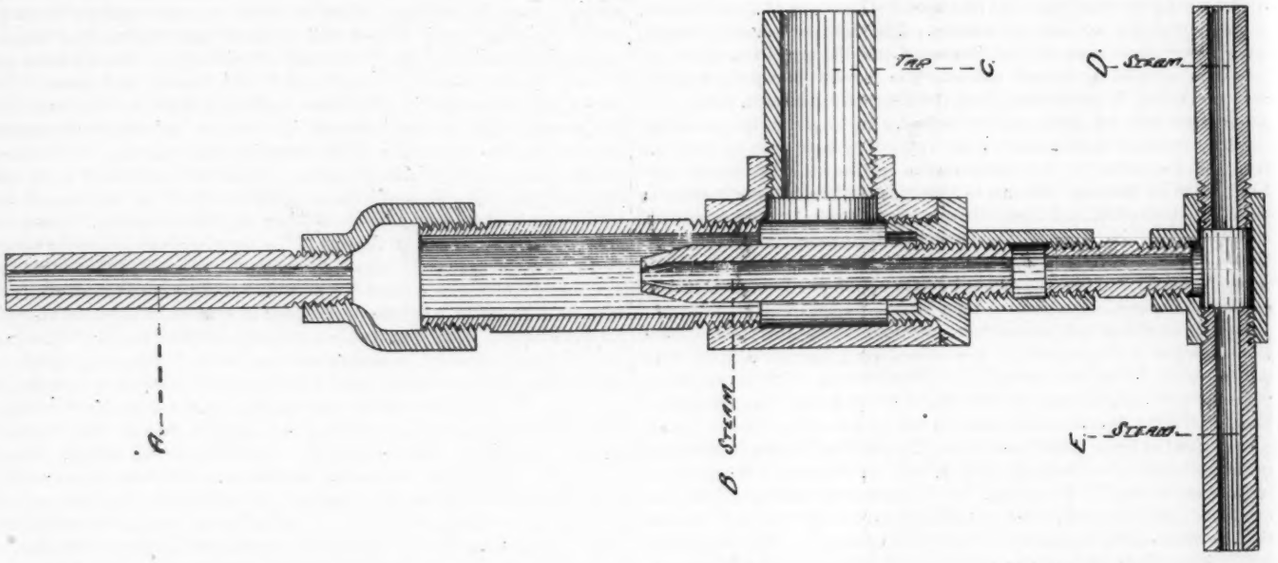
The first part of the apparatus to be constructed is the burner, proper; and for this reason. In adapting the burner you must determine the amount of space left between the steam nozzle inside of the ¾-inch pipe shown in drawing—in the burner I have in use this is ¼-inch. Why a determination of this space between the steam and tar pipes is so important is to enable the operator to fix upon the size of screen that will have to be employed to screen the tar coming from the tank. The tar tank, of iron, having a capacity, say, of 5 bbls., the tank to have a sheet-iron cover, perforated with holes ¼-inch diameter, and dished in center so that the tar will not run over the sides of the vessel, is located on the top of the bench.

Now, connect a 1¼-inch pipe to the bottom of the tank, fitting on a stop-cock at an appropriate point to control the feed, bringing the pipe down the side of the retorts—if a bench of 5's, come down to the second retort; then reduce to ¾-inch pipe, carrying this pipe between the first and second retorts; then drop the tar pipe down to and over the furnace door and connect it to the burner.

The tar supply is turned on full at all times when the furnace is in operation.

The steam supply pipe should be ¾-inch, if the boiler is not over 30 feet distant from the bench, and a steam pressure of 50 lbs. should be carried at all times when the burner is in use. Carry the ¾-inch pipe to the bench on the sides of retorts opposite the tar pipe; connect the ¾-inch pipe to a Stratton steam separator. When within 2 feet of the tar burner, reduce the steam pipe to ¾-inch, and put on a ¾-inch valve. The steam will regulate the flow of tar. Having thus attempted a description of the external apparatus, I will now pass on to the method of regulating the furnace.

Get a cherry red heat on furnace. Build up a wall, three feet from inside of furnace door, about 10 inches above line of furnace, using old tile blocks, etc., in its construction. Cut a hole 5 inches square in front wall, over the furnace door. Bank up all drafts in front of furnace, and make same perfectly air-tight. Turn on steam from boiler, taking care, however, not to admit any steam to the burner until the separator is



quite hot, or shows the steam to be perfectly dry; then, turn on steam and follow it with a full head of tar. If the fire shows smoky add steam until the fire becomes perfectly clear. Neither coke nor any other sort of fuel is required after the fire is once properly started. Tar and steam are all-sufficient.

If the heat on bench should become excessive take out the stopper over burner, or else a side stopper. I, however, always found that by adding to or taking from the steam supply, I could control the heat at the point desired.

I used 2 bbls. of tar in 24 hours to carbonize 6,000 lbs. of coal, the retorts being 14 in. by 22 in. by 8 ft. As said before, for a period of 7 months I used tar every day without any inconvenience whatever. No clinkering to be done and no coke to be shoveled into the furnace. All that was needed was to keep up 50 lbs. steam pressure, and to see that the tank was at least half filled with tar.

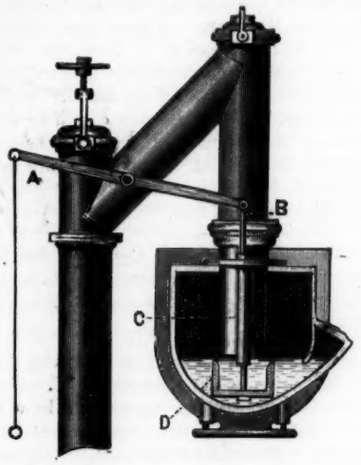
As all coal gas works have, or at least ought to have—except the Stratton separator—on hand all the articles mentioned, the cost of the plant for consuming such portion of the tar as will not bring a good market price is very slight. There is no patent right to be purchased; even the burner can be home-made. If the separator seems to be too great a luxury, put a return pipe in the lower flue, and thus superheat and dry the steam.

I no not consider it one-half as troublesome to heat a bench with tar as it would be to heat it with coke.

The Lindsley Anti-Sealing Dip-Pipe and Sealing Cup.

If those of our readers that are familiar with what were the details of a gas plant as constructed 25 years ago will compare the same with those of to-day, they will probably agree with us that the very marked and general improvement shown is the result of a series of improvements in working details.

A recent opportunity to observe the operation of the device known as the anti-sealing dip-pipe and sealing cup, devised by Mr. Edward Lindsley, Supt. and Engineer of the Peoples Gas Light Company, Cleveland, Ohio, compelled our admiration for its exceeding simplicity and perfect adaptation to the end sought, and prompts a brief description of the apparatus.



As will be noted, the illustration affords a sectional view of the principal features of the device. Referring to the drawing *D* shows the sealing cup submerged in the hydraulic seal; at *C* is shown one of the guide pipes (another is at opposite side of dip-pipe) with its lower end dipping in the hydraulic seal. *B* represents one of the lifting rods, which works freely within guide pipe *C*, and connects the cup *D* with the lever *A*.

The lever *A* actuates the sealing cup by means of the light pendant rod, fitted with a loop or eye in the lower end; the eye engaging a hook within reach of the charger, serves to hold the cup in place while the retort lid is open.

Perhaps a longitudinal section would be required to show the device perfectly; but enough is revealed in the vertical section given to enable the initiated to understand the general working principles of Mr. Lindsley's clever piece of mechanism. Other important features not brought out in the cut, and which the pressure on our columns unfortunately forbids extended mention of now, are, briefly: Arrangements whereby some benches in a range may be worked with the device as shown (without seal), whilst others in the same range may be worked in the usual manner (under seal); or all may be changed to either the sealed or unsealed system in a few moments. Provision is also made for withdrawing the seal from the bottom of the main, thereby preventing the accumulation of thick tar. In short, the device, while embracing so many practical points of advantage, seems to avoid those serious objections—such as obstructions within bridge or dip-pipes, stuffing boxes, etc.—that obtain in other devices framed to accomplish the same purpose. The device can be readily attached to most styles of hydraulic mains now in use. Mr. Lindsley will be pleased to answer any queries which may be addressed to him on this subject. His address is, "Peoples Gas Light Company, 58 Clinton street, Cleveland, Ohio."

A special from Mankato, Minn, says that Mr. Geo. T. Barr has been appointed receiver of the Mankato Gas Light Company, his bond being placed at $120,000. At the hearing before Judge Severence it was shown that the bonded indebtedness consisted of $35,000, while the floating debt appears to be $15,000, of which amount $8,400 is held by Mrs. O. C. McCurdy, of Wooster, Ohio. This woman is also the controlling stockholder, she being the widow of O. C. McCurdy, who was asphyxiated by gas at these works something like a year ago.

Laundryman John Quass, of 18 Fair street, Newark, N. J., wanted gas but did not believe in gas meters. With the aid of a rubber hose he bye-passed the measurer, and his ingenuity landed him in jail. Inspector George, of the Citizens Company, detected the offender.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Lighting Hints from Newark, Ohio.—Mr. Jas. H. Smith, President of the Newark Gas Light and Coke Company, writes that Newark has entered into a 5-year contract with the Company, based on the following terms: Public lamps, fitted with 4-ft. burners, to be maintained at the rate of $13 each per annum, the Philadelphia lighting table to be followed. The city lights and extinguishes. The Company also supplies 20 public arc lights, burning until midnight, at the rate of $40 each per annum. Gas to public buildings costs $1.80 per thousand. Ordinary consumers pay a gross rate of $2.25, subject to discounts ranging between 25 cents and 75 cents per thousand. Commercial electric lights are charged for at the gross rate of $8 each per month, and a discount on the bills therefor is allowed on the basis of that which applies to values of monthly gas accounts. The Company is growing steadily in public favor.

Mr. G. R. Vaughan has been chosen Secretary and Superintendent of the Houston (Texas) Gas Light Company, vice Col. T. F. White, deceased.

Governor Buckner, on March 16, signed the new 30-year exclusive charter recently granted to the proprietors of the Louisville (Ky.) Gas Light Company by the State Legislature. In our last we gave the leading features of the instrument. The document, however, also confers on the Company the exclusive right to make and vend *fuel gas* within the limits of its territory. The proprietors are now making preparations to largely extend the capacity of the plant, the agreed-upon items calling for a new holder (capacity one million cubic feet) and two new stacks of 12 settings—6 of nines and 6 of sixes. A new coal shed (100 x 150) s now being constructed. Besides the above, at least $40,000 will be expended this season in main relaying and extensions. The Louisville gas men evidently intend to make things hum.

Charlottesville (Va.) Wakes Up.—Some time ago we noted that the Kerr Murray Manufacturing Company had been authorized to construct an entirely new gas plant at Charlottesville, and about Nov. 1, 1887, Mr. Oliver Matson, the gentleman chosen by the contractors to superintend the work, visited the ground and went at his task with a will. The gas supply of Charlottesville is under control of the town authorities, and not much enterprise had hitherto been displayed by them in the management of their trust. The original plant was erected in 1854, and the "let well enough alone" policy had been pursued until the managers found themselves "alone," with a wreck on their hands. Perhaps the state of affairs that prevailed prior to Mr. Matson's advent can be at once comprehended when it is said that the street main governor was actually larger than the station meter, and that the boxes in the purifying house were of giant-like capacity—that is, of a giant just 3 feet square. Well, and remembering that all things come to those who are equal to the task of waiting, Charlottesville now glories in the possession of a complete 8-inch plant, prominent among the features of which will be found three benches of 5's, with self-sealing mouthpieces, a horizontal boiler, a Wilbraham exhauster (and a handsome one it is), 36-inch air and multitubular condensers, a 40-inch tower scrubber, and a 6-foot station meter, built by Helme & McIlhenny, which firm also supplied a Foulis governor. In fact, the manufacturing plant now doing the work is as efficient as the one whose place it takes was inadequate. All that remains for the authorities to do, in order that the town may reap the full benefit of the improved condition of the works, is to put down about one mile of 10-inch leading main, the laying of which undoubtedly will be proceeded with at once. It is also understood that a new holder will be constructed this summer. The citizens are quite delighted over the first substantial evidence given that the moneys expended were not in vain, because a reduction in gas rates was made in less than 15 days from the time the new plant was started up. The old rate was $2.25; the new one is $1.80—the figures being rather suggestive of the good so far accomplished. Thus does progress manifest itself at last in the lovely spot chosen years ago by Thomas Jefferson wherein to locate the University of Virginia, an institution which has done so much to preserve, because of the doings of her graduates, the fair fame of the State once truly known as the Mother of Presidents. In closing, and in simple justice to Mr. Williams, the corporation's Superintendent, it should be said that were his voice listened to the Committee on Light would long since have instituted the measures necessary to the maintenance of an intelligent manner of supplying gas to the residents.

The Marblehead (Mass.) works ran short of coal the other day, and the reason therefor was this: A vessel bound to the Company, with a cargo

of the necessary black diamonds, encountered the late lamented blizzard when off Cape Cod in the immediate vicinity of Hyannis. Strange to say, the vessel and cargo were ultimately saved, although both for a time were beached on a shore not much fancied by mariners.

INCORPORATED at Springfield, Ills., March 16th, "The Northwestern Gas Light Company, of Chicago." Capital stock, $500,000. Incorporators, Messrs. W. H. Brown, L. C. Richards and L. C. Underwood.

THE following is a fair average of the rates charged for a supply of natural gas in the Indiana district—they are a copy of those in force at Noblesville: Kitchen stove, 80 cents per month; first heater, $7 per year; second heater, $5.25 per year; third do., $3.50. First grate, $7 per year; second do., $5.25. Private lights, 5 cents per tip per month; cooking stoves in private boarding houses, $15 per year; in hotels and restaurants, $18. For heating business offices, halls. etc.: Quantity supplied by a No. 2 mixer, $10.50 per annum; No. 3 mixer, $17.50; No. 4 mixer, $24.50. Burners for ordinary lighting, 10 cents per tip per month. The following is a list of the towns in the Indiana gas belt which enjoy a supply of Nature's fuel. The number of wells, together with the average (estimated) daily capacity of each, is also appended:

	No. Wells.	Average daily capacity each.		No. Wells.	Average daily capacity each.
Arcadia	2	1,000,000	Frankton	2	2,500,000
Cicero	2	1,000,000	Yorktown	1	1,000,000
Portland	2	1,000,000	Montpelier	3	1,500,000
Dunkirk	3	3,000,000	Vernon	1	1,000,000
Greensburg	11	200,000	Swasey	1	1,200,000
Kokomo	13	4,000,000	Castleton	3	500,000
Hartford City	3	5,000,000	Fortville	1	500,000
Fairmount	2	11,000,000	Pendleton	3	500,000
Ellwood	2	2,000,000	Redkey	1	2,500,000
Lawrence	3	500,000	Knightstown	4	1,000,000
Eaton	2	3,000,000	Noblesville	25	3,000,000
Connersville	5	75,000	Lafontaine	2	2,000,000
Windfall	2	2,500,000	Jonesboro	1	6,500,000
Spiceland	1	2,000,000	Alexandria	2	2,000,000
Albany	2	2,500,000	Muncie	13	1,250,000
Winchester	4	150,000	Somerset	1	8,000,000
Newcastle	3	150,000	Anderson	7	6,000,000
Greenfield	7	3,000,000	Marion	11	5,000,000
Summitville	1	5,000,000			

A VERY FUNNY COMEDY.—There is published in Boston a paper which professes to know all about modern lighting and heating; but as it is yet in a greenly adolescent stage, perhaps we may be excused for suggesting that one important mission, even of the callow journal and journalist, is to come as near to the truth as it is possible to attain. More in sorrow than in anger do we approach this subject, and it is with the kindest intention that we undertake to point out a "few errors" in the appended paragraph from our esteemed contemporary. The Boston journalist says: "A somewhat amusing Comedy of Errors was brought about by Mr. Chas. P. Greenough, of Boston, who sent to Mayor Hewitt, of New York, a copy of his argument before the Massachusetts Legislature, on the subject of water gas—which, it is said, is interfering with the consumption of illuminating gas for fuel purposes. Mr. Greenough said he wished to attract the Mayor's attention to the subject because of the extraordinary mortality resulting from the use of water gas in that city. The Mayor, with commendable sagacity, referred the matter to President Boyles, of the New York Board of Health, who replies that Mr. Greenough's letter is somewhat refreshing when it is remembered that he is or was the president of the only company manufacturing coal gas in Boston, and is opposing the introduction of water gas wherever he can, on general principles. President Boyles holds—and we are inclined to agree with him—that an argument presented to the Mayor of New York would have had more weight if advocated by a more disinterested person." Permit us to remark that the comedy is multiplied by the commenter. It may amuse some to know that within the last five years 125 lives have been stifled in New York city through the inhalation of illuminating gas, of which three cases are chargeable to the gas made simply from bituminous coal. On the other hand, these terrible statistics will, in the minds of those unable to find cause for merriment in the sufferings of others, give rise to thought the reverse of mirthful. Passing on, and quite agreeing with our contemporary as to Mayor Hewitt's sagacity—although in this instance we fail to see why the Mayor should be particularly commended for referring a matter pertaining to the public health to the city's Health Board—we pause to say that the name of the official guardian of the health of the metropolis is Bayles, not Boyles—an error not vital but worth correcting. Again, can it be possible that our contemporary is unaware of the fact that Mr. C. P. Greenough is only the efficient attorney of the Boston Gas Light Company, and that he never has sustained any other official relation towards that well-managed corporation? Can it be that the publication referred to is unaware of the fact that eight coal gas companies are to-day in active operation within the city limits of Boston? Perhaps our contemporary is only poking fun at its readers! In that event we would respectfully recall once more to its notice the "Cervantes-Gitanilla" reference in another column of its "comedy issue—"don't put too fine a point to your wit for fear it should get blunted." In conclusion, we wish to say a word or two about President Bayles' disinterestedness regarding his position as the referee of the Mayor in the matter of water gas manufacture. Mr. Bayles—he is also one of the editors of the *Iron Age*, of this city—is at present engaged in an attempt to manufacture fuel water gas to be used in conjunction with a certain industrial operation. Mr. Wilkinson, of the Mutual Gas Company, of this city, easily can, if he will, furnish our contemporary with all the details of this affair. Last of all, if Mr. Greenough's argument is unsound, why not lay bare its errors by exposing the fallacy thereof. Sneers and "delicate wit" are pigmy weapons wherewith to assail the barriers of fact.

THE Rochester (Minn.) Light and Fuel Company has been incorporated by Messrs. F. F. Walker, of Dubuque, Ia., T. Hennessy and W. O. Mulcahey, of Grand Forks, Dak. Ter., and A. Bierman, of Rochester. Capital, $100,000.

ANNISTON, Ala., wanted a gas company so badly that franchises were granted, first, to T. G. Foster, of Montgomery, Ala., and again to the New York Contract Company. An agreement, however, has been reached between the contending parties, under the terms of which the last-named corporation will build the works and carry on the business. About $50,000 will be absorbed in the enterprise.

AT a regular meeting of the Cambridge (Mass.) Board of Aldermen an order was adopted authorizing the Committtee on Lamps to contract with the Cambridge Electric Light Company for the maintenance of 100 arc lights at the rate of $15 each per month. The contract is to last for three years.

WE regret to announce the death of Mr. Tristram Scamman, who had acted for many years as Treasurer to the Saco and Biddeford (Me.) Gas Company. His demise occurred at Jacksonville, Fla., on the 19th of last month. He was in his 78th year. He had been one of the leading members of the Unitarian Church in Saco, and was a prominent figure in York county's Masonic history.

THINK OF IT.—Councilman Missar recently introduced an ordinance in the Cleveland City Council which aims to reduce the price of gas in Cuyahoga county to 75 cents per thousand cubic feet. Following so closely on the Cleveland Company's recent and voluntary reduction to $1 per thousand, this savors strongly of persecution.

THE Helena (Mont.) Electric Light Company's works were destroyed by fire on the 12th ult. The loss is placed at $20,000, with an insurance of $9,000.

THE Sheriff was recently placed in charge of the Vancouver (B. C.) Electric Light Company's belongings at the instance of a writ issued by the Bank of Montreal for $3,051.48.

POTTSVILLE (PA.) IN DESPAIR.—The plunge of Pottsville into utter despair has now to be recorded. The trouble occasioned by the accidents at the gas works was intensified on the evening of March 16 by the collapse of the boiler at the electric light station. The hour that is darkest, perhaps, has now been registered.

DR. WM. H. RYDER, late Vice-President of the Chicago Consumers Gas Company, and also a member of the Directorate of the old Chicago and Town of Lake Gas Light Companies, is dead. His associates in the three Companies severally expressed, in formal manner at special meetings, their sorrow at his loss and their appreciation of his labors. The resolutions prepared by Messrs. Forstall and Yuille on behalf of the old Chicago Company are especially touching, because of their straightforward sympathy.

THE Fort Wayne (Ind.) City Council has entered into a contract with the local Jenny Electric Light Company, under which the latter is em-

powered to light the city with arc lamps for a period of 3 years. The agreed-upon price is $135 per lamp per annum.

Chas. F. Hartmeyer, in concert with several other stockholders, applied to the local Court of Common Pleas, Cleveland, Ohio, for the appointment of a receiver to conduct the affairs of the Circleville, Edison, Electric Light Company. The petitioners allege that the Company is insolvent, and hope that a receiver may eventually discover something for them in the shape of salvage.

A Sample Order.—The following blizzard echo comes from almost every city and town east of the Harlem river, and without undue stretching could easily be made applicable to many a city and town south and west of that placid stream: "At Bridgeport (Conn.) on Monday, March 12, so many electric light wires were broken by the storm that the Mayor forbade the starting of the dynamos as involving a danger too great to be risked."

Last month the residents of "Black Point," San Francisco, Cal., were one afternoon startled by an explosion in the works of the Pacific Gas Improvement Company, on Fillmore and Bay streets. Although the report was tremendous, not much damage was done. The happening is chargeable to the carelessness of some workmen who were engaged in "blanking" a live 12-inch pipe. The city's firemen thought they had a job on hand; but on their arrival at the "Point," Supt. Eichbaum told them they could go home.

The old St. Louis Company has reached that stage of progress where torches are to supplant the ladders of its lamplighters! The rounds of the force can thus be lengthened, and the spirit of the lighting table be more closely matched.

Following our notice of the determination of the St. Louis Laclede Gas Comp ny to construct a relief holder in the West End of the city, we can say that the proposition has aroused considerable opposition on the part of some of those who own property in the vicinity selected. It is said that a real estate dealer, named Donovan, will attempt, by means of injunction proceedings, to stop the work. He alleges that the property in the neighborhood is principally devoted to residence uses, etc.; but we imagine that Mr. Donovan will have quite a time of it in attempting to convince even a St. Louis Court that the slaughter houses just over the way from where the new gasholder will stand are adapted to the permanent and comfortable housing of people who, properly insisting on the respectability of their surroundings, would like to further have an uninterrupted vista savoring of every rural charm. Perhaps, however, the bovine sounds admit the slaughter houses to the list of ruralities, in which event the gasholder may take hope, because its occasional creakings may be taken for the soughing and the sobbing of a forest in distress. Donovan or not, it is quite likely that Capt. Keiser will win, as usual.

The Committee on Light, Alexandria, Va., has determined to follow the example set by the Committee at Charlottesville. The gas plant, which is owned by the city, is to be entirely remodelled, a new holder to be included in the bargain. Messrs. Bartlett, Hayward & Co., of Baltimore, Md., will furnish the iron work.

An attempt is being made in the Legislature to rehabilitate the charter of the Equity Gas Company, which was authorized in 1874 to supply gas in the Eastern District of Brooklyn, N. Y. The original charter lapsed through the indifference of those who then proposed to carry on the enterprise. It is now said that ex-Senator Wagstaff and other men of wealth will, with the asked for sanction of the State, carry out the aims and intentions of the original incorporators. A bill similar to this was passed by both houses last year, but failed to receive Gov. Hill's approval. As the same "Democrat" still occupies the Executive Chamber, and he has a pretty good record for consistency, we fail to understand how Mr. Wagstaff can hope for a reversal of the Gubernatorial opinion.

The furnaces in the four-storied gas works, recently constructed to the order of the Standard Gas Light Company on East 115th street, this city, were fired up about a fortnight ago. Mr. Flannery deserves great praise for the excellent material and workmanship which he selected and employed in the construction. It certainly will not be his fault if any untoward happening occurs hereafter in the purifying department, for the boxes are as well anchored as it is possible to have them. The maximum daily capacity of the plant is 2,000,000 cu. ft. The proprietors are to use, so we are told they say, Lima crude oil for enriching; and we are inclined to the view that it must be of the most pronounced "B. S." variety, since they told one of Pulitzer's reporters that the oil costs but 35 cents per bbl., delivered on the "basement" of the works. Among other things that Pulitzer's young man heard up in 115th street was the following: "By using a special meter and making a separate connection with the ordinary pipes, the illuminating gas can be *aerated* to any degree required for fuel purposes, which will bring the price of 1,000 feet to—well, never mind the figures—say, about half of the cost for illuminating use." Aeration sounds pretty, and when you come to analyze it, is quite appropriate. Still, there is no reason why the Standard's aeration system should not be fully equal to any of the producer gas plans now on the market. Nitrogen is the same, no matter where or how you obtain it, and it does not come high either.

At the annual meeting of the Georgia Steam and Gas Pipe Company, Columbus, Ga., Messrs. W. L. and F. A. Clark and E. H. Jenkins were elected Directors. The Board then elected the following officers: President, E. H. Jenkins. Treasurer, F. A. Clark. The entire stock of the company is now owned by the gentlemen mentioned, they having purchased the shares formerly controlled by Messrs. Blanchard and Dexter. The Company was quite successful last year, and the outlook for '88 is exceedingly bright.

We regret to have to announce the death (at her home in Buffalo, N. Y., on March 22d) of Mrs. Caroline B. Krumholz, the estimable wife of the Secretary of the Buffalo Gas Company. The funeral services were held in St. Michael's Church, Buffalo, on March 26th. We offer sincere sympathy to Mr. Krumholz in his great bereavement. Deceased was in her 48th year, and the memory of her life and womanhood will long be cherished.

The Lancaster (Pa.) Council awarded the contracts for public lighting for the next three years to the following parties: Gas to lamp posts and public buildings, to the Lancaster Gas Light and Fuel Company—lamps to be paid for at the rate of $24 each per annum; arc lights to the local branch of the United States Company—the American Company was slightly underbid on the basis of a 3 year contract; naphtha lamps to the Pennsylvania Globe Company. The Edison Company offered to perform the entire lighting of the city; but the Council Committee "doubted the advisability of completely displacing the gas lamps, believing that gas, and even oil lamps are desirable adjuncts to call upon in case of an accident, so common to all electrical machinery." Right you are, Messrs. Councilmen; all the eggs should not be put in one basket.

At the annual meeting of the Middletown (Conn.) Gas Company, Messrs. B. Douglas, A. B. Calef, W. T. Elmer, W. H. Burrows, E. H. Hubbard, S. B. Hubbard, H. L. Mansfield, F. E. Camp and W. Wilcox were elected a Board of Directors. The executive management of the Company remains unchanged, the *personnel* thereof being as follows: President, A. B. Calef; Sec. and Treas., Fred. E. Camp; Supt., Jno. H. Jones, assisted by S. D. Clark. The Company may make important plant improvements this season.

The Troy (N. Y.) Gas Light Company has offered, through the city Contracting Board, to furnish 800 public lamps (equipped with 5-ft. burners) for one year for the gross sum of $20,000, which is an exceedingly important concession from the proposition previously submitted. This was an agreement to perform the same work for the same money, but a 4-ft. burner was to be used. At the present time a mixed system of lighting (half arcs and 3-ft gas burners) is followed, which cost the city last year a total of $54,000. The electric company is receiving 47 cents per light per night, but wants 50 cents for a renewal of the contract. The matter was to have been settled last Tuesday, but we have not heard that a decision was reached.

Mr. E. H. B. Twining is now acting as General Agent for the Woolley Magnetic Engine Company, of Grand Rapids, Mich. This Company is manufacturing an electric motor intended for driving family sewing machines, jeweler's lathes, etc., or in those minor industrial occupations where less than one-horse power is sufficient for the end in view. Mr. Twining's address is, "76 Dearborn street, Chicago, Ills."

The executive management of the newly-organized Gas Company for Anniston, Ala., will be thus arranged: President, Julius Lipman. Sec. and Treas., M. Kind. Directors, J. Lipman, M. Kind, J. C. Keith, E. A. Oldham and T. G. Macy.

Perhaps before this appears the trade shall have been made; but in any event negotiations were pending a fortnight ago for the transfer of the Penn Yan (N. Y.) Gas Light Company to parties who proposed to operate an electric lighting plant in connection with the gas supply.

The capital stock of the Sandusky (O.) Gas Company has been increased to $250,000—just 100 per cent. more than it was.

Mr. Geo. Keaton, formerly of Portland, Oregon, is now in the service of the Los Angeles (Cal.) Gas Light Company.

We are in receipt of a copy of the Annual Report (1887) of Supt. W. C. Adams, of the Richmond, Va., City Gas Works. Under his careful management the plant has been kept up to a high standard, but the emergencies of the situation require that considerable addition be made to the apparatus this season—that is, if Richmond wants to secure the benefit of a cheap and abundant supply of gas. The receipts for gas, coke, etc., including a charge of $1 per thousand for gas consumed in the street lamps and public buildings—in reality no money is collected in this service—amounted to $242,004.89; as the disbursements were $152,473.68, a profit for the year of $89,531.21 is shown. The maximum make occurred on Dec. 15, when 826,200 cubic feet passed out of the station meter; the maximum sendout—866,655 cubic feet—was registered on December 17th. The main mileage is now 60 miles 505 yards in length. During the year the moontable system of lighting was superseded by an all night and every night service, and this increased the quantity of gas used over that of last year in the public lamps by 5.41 million cubic feet, a portion of which must be charged, however, to 65 additional lamps. The street lamps number 1,465. The total make of gas in the year figures out at 179.10 millions, an increase over '86 of about 9¼ per cent. The gas averaged 19.57 candles for the year, and the range in value (minimum and maximum) was but 0.79 of a candle—19.21 in April; 20 in March. This shows whether or not Supt. Adams was around the works a good part of his time. Meters in use 5,290; taken out during year, 151; added, 317—a gain of 166; 609,575 bushels of coke were made. Looking over the figures it is not to be wondered at that a "syndicate of capitalists would like to take over the works." Of course, they would! Why not? But their assurance, or rather the argument they use to attain their ends, ought to seem particularly brassy to the taxpayers. In brief, the purchasers (only mentally, as yet) say, "Lease us your plant for a term of years, and we will supply you with better and cheaper gas than you are now getting." If the Committee on Light (and Chairman Powers is a pretty good business man) only listen to Supt. Adams' demand for better facilities, that gentleman will give Richmond as good and cheap gas as can be furnished by any set or syndicate.

We have received a pamphlet in which are grouped some reasons why no change should be made in the Massachusetts law restricting the sale of gas carrying an excess of carbonic oxide. Mr. Chas. P. Greenough, counsel for the Boston Gas Company, compiled the facts and performed the grouping, and his arrangement of Mankato (Minn.) gas happenings within the twelvemonth is well worth looking at and reading over. Once read, it will not be easily forgotten.

The gas well at the Wayne county (Mich.) Poor House is now at a depth of 700 feet, and still sinking. At 200 feet a flow of fine spring water was developed, at 210 feet mineral water appeared, and at 650 feet salt water came, too. In consequence the pump or tube now spouts an excellent natural cocktail.

Mr. Oliver Cheney has now leased the Woodland (Cal.) gas works, the same having recently been purchased by the local electric light company. The first thing that Mr. Cheney did was to raise the price of gas to $3.50 per 1,000, the prior rate having been $3. He perhaps may be excused when it is said that the cost of coal in Woodland went up to $13 from $7 per ton. Prior to the advent of the electricians gas sold in this place at $4. Our correspondent is of the opinion that Mr. Cheney is really the electric light company, the proprietors of which, finding no excessive profit in supplying electricity, will now try to get even by selling gas, per their agent, as above hinted.

In an election at Carthage, N. Y., the voters have just decided to continue arc lighting for the streets. Further than this, they want 6 more, which will bring the total cost per annum to $1,330.

Mayor Jones, of Williamsport, Pa., has vetoed the Council ordinance awarding the public lighting to the local Edison company for a term of two years. The Mayor favors electric lighting, but does not think the Edison proposition quite fills the bill.

The Washington (D. C.) Gas Light Company has elected Mr. Jno. C. Bullitt, of Philadelphia, Pa., to fill the vacancy in its Board of Directors caused by the death of the late Mr. B. H. Bartol.

From the Elevated City.—Mr. W. J. Fay, President and Manager of the Denver (Col.) Gas Company, writing under date of March 24, says: "At our last annual meeting the following officers were elected: Pres. and Manager, Wm. J. Fay; Vice-Pres., Jas. H. Archer: Secy., Frank McManus. The annual reports proved the Company's affairs to be in a most prosperous state. The new retort house is a blooming success; so, also, is the $1.50 rate for gas. We have had our usual annual visit from the philanthropist who wishes to construct an opposition plant solely for the benefit of the people and the gas consumers—provided they (the people) will buy the bonds, or otherwise put up the wherewithal. The last attempt is a rather sickly affair, although its promoter proposed to fly high—about the first of April—on which date the dear people were to have been supplied with gas. As nothing had been done up to to-day, it strikes me the proprietors will hardly be able to build a complete gas works in the remaining March days. Perhaps it was only a seasonable joke. We have a very vigorous competitor in the shape of our local electric lighting company, which appears to be willing to do almost anything to beat the Gas Company. The indications, however, are that we shall survive." Not much doubt about it, Mr. President.

About 10 days ago the lower branch of the Maryland Legislature adopted an amendment to the bill regulating gas rates in Baltimore which adjusts these at $1.50, $1.40 and $1.25 per thousand, less 25, 20 and 25 cents, for each successive five years.

Mr. A. B. Stannard is now acting as Manager of the Ohio department agiencies of the American Electric Construction Company.

The New Albany (Ind.) Council has extended the charter of the Gas Company for a period of 20 years. The ordinance establishes the following gas rates: Public lamps, $18 per annum; gas to public buildings, $1.50; gross rate to ordinary consumers, $2.10; to extraordinary consumers, $1.85—both classes to have the benefit of discounts (10 per cent.) now available on account of prompt payment.

The Duluth Gas and Water Company has purchased a large plot of ground on Rice's Point whereon to construct a new gas works. The present East End plant is totally inadequate.

Legal Pertinacity Rewarded.—The Supreme Court has just awarded R. A. Tilghman, of Philadelphia, $320,000 damages for the infringement of his glycerine patent, deciding that an infringer who defies a patentee cannot, after legal defeat, escape by paying merely the license fees which a licensee has paid. The license fees would have amounted, without interest, to $35,000; but the court awarded nearly ten times that amount as damages on the ground that an infringer is liable to account for all the savings and benefits derived from the wrongful use of the patent. Mr. Tilghman was once defeated in the Supreme Court by a vote of four to three, the same vote by which the telephone case was decided. Mr. George Harding, of Philadelphia, the counsel representing Mr. Tilghman, brought a new suit and carried it again to the Supreme Court. That Court then reversed its former decision by a unanimous vote, and awarded him the amount above named.

Size of Steam Pipes.

The *American Engineer* says that considerable question has been raised of late as to the size of steam pipes leading to engines. The pressure in the steam chest should be at all times within at least one or two pounds of boiler pressure; for comparatively short distances the pressures should be alike. In most cases any lack of pressure in the steam chest is at once attributed to an insufficient area in the steam pipe, while it is, in fact, quite often due to a reduced area of steam stop. All valves, whether in the steam pipe or in the chest, should have area enough to permit of a free circulation of the steam without reducing the pressure.

The main steam pipe should be of such size that the velocity of steam passage through it should be at a rate of not more than 7,500 feet per minute to keep up an ample supply. This is an average speed for all conditions. If the chest is large and there is ample time for its easy filling up again between the cut-offs of each end of cylinder, the velocity of the steam through the pipes may be somewhat reduced, but it is hardly safe to figure so close. Through the steam ports a free circulation should be permitted, especially where the ports are numerous and narrow. The friction through a number of small ports is much greater than through a single port having equal area; also where the exhaust steam passes through the same ports as the live steam, allowance should be made to provide for a free movement of exhaust, but care should be taken that such liberal allowance for free passage should not develop too excessive a clearance; hence for every increase in width a decrease in length of passage between cylinder circumference and valve face should be sought. The movement of the steam to the cylinder through the ports should not exceed a rate of 6,000 feet per minute. The quick or slow movement of the admission valve should be considered with reference to this rate of admission. In fact a quick movement only should be considered and permitted if a good engine is expected. The exhaust release should be free and of equal speed with the live steam, so that the pressure in the passages and condenser should not differ much at the moment of release, in other words, the steam should move directly (not expand) into the condenser. Of course, the same conditions should maintain in the passage of steam from a high pressure cylinder to a low pressure cylinder of a compound engine that the movement of the exhaust steam to the receiver, or lower pressure cylinder, as the case may be, should be such that no reduction of pressure would result. Where a receiver is used, there not being a constant supply or feed, the pressure is raised by the admission of steam from the high pressure exhaust and lowered by the discharge of steam into the low pressure cylinder

[Official Report.]

Fourth Annual Meeting of the Ohio Gas Light Association.

Held at the Sloane House, Sandusky, Ohio, March 21 and 22, '88.

First Day—Morning Session.—Wednesday, March 21.

The Association was called to order by President Printz, and Secretary Butterworth recorded the transactions.

On motion of Mr. W. H. Denniston, the minutes of the last meeting were adopted as published in the American Gas Light Journal.

Roll Call.

The following members were present:

Honorary Members.

Thomas, Jos. R., N. Y. city.

Active Members.

Alexander, J. W., Painesville, O.
Bate, Joseph M., Canton, O.
Butterworth, Irvin, Columbus, O.
Canby, R. H., Bellefontaine, O.
Christian, G. H., Jr., Norwalk, O.
Clark, D. M., Elyria, O.
Coombs, M., Jr., Youngstown, O.
Coverdale, R. T., Cincinnati, O.
Cradit, S. B., Ripley, O.
Critchlow, J. M., Pittsburgh. Pa.
Day, F. W., Columbus, O.
Dell, John, St. Louis, Mo.
Denniston, W. H., Pittsburgh, Pa.
Dittmar, R. A., Troy, O.
Evers, M. B., Jr., Lebanon, Ind.
Fabing, Fred., Fremont, O.
Graeff, G. W., Jr., Phila., Pa.
Green, R. P., Columbus, O.
Gwyn, E. C., Springfield, O.
Gwynn, Jos., Fostoria, O.
Harris, Geo., S., Mansfield, O.
Harris, J. A., Phila., Pa.
Hurlburt, H. L., Oberlin, O.
Lee, Richard, Piqua, O.
Lindsley, E., Cleveland, O.
Light, Geo., Dayton, O.
McCall, Hugh, Tiffin, O.
McCann, Jas., Portsmouth, O.
McCook, G. W., Steubenville, O.
McDonald, Wm., Albany, N. Y.
McMillin, E., Columbus, O.
McMillin, Murray, Marietta, O.
Murphy, J. M., Chicago, Ills.
Page, G. S., New York city.
Phillips, J. H., Cincinnati, O.
Philipp, E. B., Findlay, O.
Prichard, W. W., Ironton, O.
Printz, Eugene, Zanesville, O.
Roots, D. T., Connersville, Ind.
Ross, W. A., Kenton, O.
Sisson, F. N., Columbus, O.
Stacey, Wm., Cincinnati, O.
Stannard, A. B., Columbus, O.
Tayler, Geo. H., Warren, O.
Welch, Chas. H., Athens, O.
Wilkiemeyer, Herm., Lancaster, O.
Witham, Simeon, Gallipolis, O.
Wood, P. J., Wilmington, O.
Wood, Thos., Sandusky, O.

Report of Executive Committee.

The following report from the Executive Committee was read by the Secretary:

The Executive Committee unanimously recommend the adoption of the following:

1.—That E. S. Funnell, of Albany, N. Y., be elected to Honorary Membership.

2.—That J. L. Kelly, of Middletown, O., and T. A. Bates, of Norfolk, Va., be, on their own request, released from membership.

3.—That the name of this Association be changed to "The Ohio Gas and Electric Association."

4.—That the excursion to Findlay take place, as advertised.

5.—That a third session be held to-morrow afternoon, if it should be found necessary to do so.

6.—That this Association appoint a member to co-operate on our behalf with the American Association in the matter of securing uniformity in meter connections.

7.—That the salary of the Secretary be increased to $125 per annum, commencing with the present year.

On motion of Mr. R. H. Canby, the report was received and its several recommendations acted upon separately, with the following results: Recommendations one and two were approved—the Secretary cast the ballot of the Association in favor of Mr. Funnell's election to Honorary Membership. The third recommendation was rejected, the vote thereon standing 7 for, 10 against. The fourth and fifth items were approved. In connection with the sixth recommendation, Secretary Butterworth read the following letter from Secretary Humphreys, of the American Association.

American Gas Light Association,
Lawrence, Mass., Mar. 14, 1888.

Irvin Butterworth, Esq., Secretary Ohio Gas Light Association, Columbus, Ohio:

Dear Sir—The American Gas Light Association at its last meeting appointed a Committee, charged with the duty of endeavoring to secure uniformity in meter couplings; and I was instructed to bring the matter to the attention of kindred Associations, in the hope that they would join with us in the endeavor to bring about this desirable result.

Will you be so good as to see that the matter is brought up at the forthcoming meeting of your Association, and ascertain, first, whether the members think that a uniform meter coupling would be desirable—that is, to have all the manufacturers make a standard coupling for a given size of meter; and, secondly, whether your Association will give anyone power to co-operate with us in the matter. I am, dear sir,

Yours truly,
C. J. R. Humphreys, Secretary.

The sixth recommendation was then approved, and Mr. J. M. Murphy was appointed to represent the Ohio Association on the Committee of Conference. The seventh recommendation was also approved.

Applications for and Election to Membership.

The following applications for membership were received:

Booth, Miller, Bellaire.
Bird, S. E., Mansfield.
Cline, J. W. R., Springfield.
Cantine, W. W., Alliance.
Dick, S. B., Meadville, Pa.
Dalzell, S. M., Erie, Pa.
Faben, C. R., Jr., Toledo.
Gartley, W. H., Chicago, Ills.
Gwynn, J. W., Bucyrus.
Guldlin, O. N., Fort Wayne, Ind.
Hedges, J. S., Mansfield.
Matt, Geo., Lancaster.
Milne, D. S., Jamestown, N. Y.
Mandeville, W. H., Lima.
McKay, John, Titusville, Pa.
Penn, J., Washington C. H.
Prout, A. W., Sandusky.
Rolston, W. L., Marietta.
Strong, L. A., Mansfield.
Skinner, J. M., Cincinnati.
Stoll, A. J., Sandusky.
Sherrard, R., Jr., Steubenville.
Truck, Geo. M., Warsaw.
Taylor, O. P., New Philadelphia.
Zimmermann, Wm. F., Pittsburgh, Pa.

The applications were referred to a Committee (Messrs. R. T. Coverdale, G. S. Harris, and Jas. McCann), who subsequently reported in favor of the aspirants. The Secretary cast the ballot of the Association for their election to membership.

Reports of Secretary and Treasurer.

The Secretary submitted the appended annual report:

Cash in hands of Secretary at beginning of year.	$4 00	
Received for dues and initiation fees	309 00	
Total credits		$313 00
Expenditures (itemized)	$149 96	
Remitted to Treasurer	139 04	
Total debits		289 00
Balance in hands of Secretary		$24 00
Dues unpaid, '87		$78 00
Dues for '88, now collectable		291 00
Total dues now due		$369 00
New members admitted at '87 meeting		21
Released from membership		2
Present number of active members		100
" " honorary members		6
Names on mortuary roll		4

There were no deaths during the year.

The Treasurer, Mr. E. C. Gwyn, submitted the following statement, dated March 21, 1888:

Received from the Secretary, April, 1887	$545 28
Interest received on same	18 53
Total funds on hand	$563 81

Both the reports bore the approval of the Finance Committee. The statements and indorsement were received, accepted, and filed.

Appointment of Special Committees.

The President appointed the following special committees: *On Nomination of Officers.*—J. M. Bate, W. W. Prichard, Geo. H. Tayler. *On Place to Hold Next Annual Meeting.*—R. H. Canby, R. A. Dittmar and Edward Lindsley.

Letters of Regret.

Letters were received and read from the following gentlemen, who expressed their regret at being unable to respond in person to the invitation to be present at the convention: J. P. Harbison, A. W. Littleton, B. E. Chollar, A. C. Humphreys, Jas. Somerville and F. Egner.

THE PRESIDENT'S ADDRESS.

President Printz here read the following address:

To the Members and Friends of the Ohio Gas Light Association:—It is a matter of congratulation after a year, which we have every reason to believe has been one of prosperity and profit to those engaged in the manufacture of gas, and other light industries, also to those engaged in the manufacture of the machinery necessary to the production of those industries, that we have the pleasure of again coming together for the purpose of hearing and discussing questions of interest in our particular line of business.

This is our Fourth Annual Meeting, and should it be of as much profit and as interesting as were the preceding meetings, then, surely, none will have cause to regret the time and money spent in being here. That such will prove to be the result, we have every reason to hope.

It is one of the pleasant duties which devolves upon the presiding officer of this and kindred associations to welcome you to another meeting, and I assure you it is with the greatest of pleasure that I do now greet you with that welcome. Thus far in the year we have not been called upon to mourn the loss by death of a single member of the Association, and truly we must say we have been unusually blessed since the date of our organization, when we consider that, notwithstanding the advanced age of many of our members, we have lost but four.

We number at present six honorary and 100 active members, quite a fair addition to that little squad which met at the Park Hotel, in Columbus, Ohio, Sept. 17th, 1884, for the purpose of perfecting an Ohio State organization. Our Association has indeed grown in numbers and strength, and I say with pride we include in our membership some of the most eminent gas men in the fraternity. Now, whilst nearly every gas company in the State has one or more representatives with us, there are a few that have not seen fit to unite their interests with ours. Can it be that it is the small amount of the initiation fee and the yearly dues imposed which deters their joining? If so we can assure them the benefit to be derived from a single meeting will repay that sum with interest. Possibly they do not deem it necessary, as they may already be wise enough; but if such is the case then the more desirous are we to have them in our fold, so that we may have the benefit of their superior knowledge.

During the session of that preliminary meeting held at Columbus we enjoyed the privilege of listening to some remarks from our venerable Honorary Member, Prof. S. H. Douglass, of Ann Arbor, Mich.—remarks applicable on that occasion as well as on all succeeding similar occasions. The subject he more particularly referred to was the A B C of chemistry as connected with gas making, advising the members to make that branch of the subject a specialty; for without the aid of chemistry we could not expect to be thorough gas manufacturers. In fact, without its aid one is in a great measure laboring in the dark; for many of the perplexing matters relative to the manufacture of gas, while insignificant in themselves, were great trials to the manager not conversant with at the least the rudiments of chemistry. His remarks made on that occasion are as applicable to-day as they were at that time, and I would advise the younger members of the profession (and others as well) to make the study of the chemistry of gas making, both in theory and practice, a duty. You may reply you have not the time to spare to devote to the study of books, and to follow out the experiments necessary in this line of research. Allow me to say that, with the proper application of your chemical knowledge thus acquired, you are sure to be relieved of many hours of anxiety, passed in the endeavor to fathom some of the perplexing questions connected with gas manufacture. If you have not such books as you need, it is surely advisable that the directors of your companies see that you are provided with the necessary works on the subject. A small outlay in this direction will, without a doubt, repay itself tenfold.

Explosions at gas works are getting to be quite common occurrences; and for convenience, or some other purpose, are designated "mysterious" explosions, often attributed to the too free use of dynamite. Why dynamite should be used about a gas works is no doubt a mystery; but I am inclined to think that many of the so-called mysterious explosions would likely have another name if the subject were properly investigated, or if those directly interested would be willing to give the proper information.

I would say here, to those having the management of gas works, do not depend too much on your subordinates; they certainly mean well, but are prone to become careless unless you, with a sharp eye, are on the alert.

How many of you can call to mind times when in your rounds of investigation you have found a syphon dry, a stop-key open, or, possibly, a plug out, which, but for your fortunate discovery, would likely have led to a mysterious explosion? No doubt many of you have met with just such experiences. Then, again, a stoppage in the pipes, breaking the water seals, or, as is sometimes the case, a rust hole in the purifier cover, for want of immediate and proper attention, causes a leak of gas which, under some circumstances, will easily produce the mysterious explosion. If the managers of gas works will attend to the proper ventilation of the buildings, and also adopt the old rule of not delaying until to-morrow things that should be done to-day, they will, in a great measure, settle the subject of mysterious gas, or so-called dynamite explosions.

Cleanliness of everything pertaining to or about a gas works should be the imperative command of all having the control of their management. How often do we see this order enforced; is it not more likely to be the reverse? Many times on our visits to the smaller places we find the little machinery they have begrimed with dust and tar, the accumulations of months, enough perhaps to make it almost impossible to distinguish which particular piece of machinery one is looking at. One instance can be cited. There had been for quite a time complaints of poor gas from the consumers; sometimes it gave a blue light, at other times a tolerably satisfactory one, but continually fluctuating. On an examination being made it was discovered that the governor for the steam jet exhauster was foul, did not move, and could not perform its duty; the amount and illuminating power of the gas drawn from the retorts were dependent on the increase and decrease of the steam pressure in the boiler; a slight rise in the pressure being sufficient to draw the furnace gases through the retorts, thereby producing the blue light which was complained of at times. In the same place was found a P. & A. condenser not working. Upon inquiry it was learned from the foreman, as he stated it, that it had been placed in position five years previous, and as it performed its duty properly at that time, he supposed it was continuing to do so. He had never taken the trouble to notice as to its need of being cleaned or requiring any attention. However, this may be an exaggerated case, and is only referred to as proof that where the surroundings are permitted to be uncleanly the inside and working parts of the machinery are very likely to be, in a short time, in the same condition. I am happy to say this state of affairs does not exist in *all* the smaller works; and I cannot deny but that it may be found to some extent in some of the larger ones.

Again, if the rule of order prevails, the workmen soon learn to take pride in having things about them tidy, and they themselves will look to the slight leaks of gas and tar, as well as after the coke and coal that in some manner in the slovenly conducted works find their way to the cinder dump. *All* little things, taken separately; but they count very perceptibly at the close of the year's business.

As to the combination of gas and electric light interests, we had at our last annual meeting two very able papers on the affirmative side of the question. During the year a number of gas companies have followed the advice given at that time; others, owing to the circumstances which surround them, do not see their way clearly to such combination, and some others are of opinion that it would be contrary to their interests to do so. Of course, all are to be in a great measure influenced by the local circumstances which prevail in their individual neighborhoods.

I feel, while we are gas men, we are really suppliers of *light*, and should be prepared at all times to furnish any kind required. To be sure, all may not be enabled to realize a fair return on the money invested in the electric plant, and may have to give the matter closer attention than the gas question; yet, to protect the gas department and to prevent competition (which would only for a short time, if at all, benefit the consumer) I believe a combination of the two interests under the one management to be advisable.

Again, the union of water gas plants with those making gas from coal is being considerably agitated, and with some degree of success. We had expected to have read at this meeting a paper on this subject, which, with the discussion to follow, would have given us a better understanding of the subject. As it is, those advocating the plan claim, first, a more satisfactory light to the consumer—while the candle power may not be any higher, the white light produced by the admixture of the water gas is more pleasing; second, a protection from strikes, in that it requires but little skilled labor to manipulate, and, again, it is a ready means of generating large quantities of gas in a short time. Also, in the production of high candle power gas—above a certain indicated grade it can be made for less cost per thousand cubic feet by the water process than by the old method, which necessitates the use of high-priced enriching materials. Yet the whole question resolves itself, and surely must depend entirely upon the first cost of the materials consumed in the manufacture by either process, separately or combined; also as to the prices received for the residuals in the particular locality in which the gas plant may be situated.

Incandescent gas lighting and fuel gas are subjects on which we are o have papers submitted at the present meeting; therefore it would not be proper for me to dwell on them at this time, and I will only remark that they are subjects of vital importance, and are calling for and receiving the earnest attention of all live gas people of the day. We hope and expect the papers, with the discussions thereon, will give us a proper understanding of those questions.

We have had lately many new styles of gas burners introduced to the trade, possessing more or less merit, nearly all claiming an increased amount of light in proportion to the quantity of gas consumed. So far the Lungren lamp appears to have the lead. It is the most economical in the consumption, and can be used almost equally well in the burning of all kinds of illuminating gases. The Welsbach is designed more especially for incandescent gas lighting, and is claimed to give its best results in that particular field with the use of fuel gas, although with water or coal gas it produces a beautiful white light, superior and more pleasing in the opinion of many persons to any electric light. It is open to this one serious objection: The mantles or hoods are quite frail and, like the glass bulbs used in incandescent electric lighting, are liable to fail at any time; but it is to be hoped some inventive genius will, in the near future, overcome that difficulty, and then, if the manufacturers will place the burners on the market at a price at which they will come into general use, the result will be very gratifying to the gas fraternity.

With the many aids that have lately been called into requisition to assist in the day consumption of gas may be noticed a machine designated as the "Tangye gas hammer." The same arguments can be truthfully urged for it as for the gas engine, especially when applied to small works. There is less danger from fire, it is more convenient and economical, and is just as efficient as the hammer driven by steam power. Possibly some of you may have in your several communities an opening to place a machine of this kind to the mutual advantage of the consumer and your company.

A word here to the manufacturers of gas stoves will not be improper. With the incoming of the New Year there has been shown a desire on the part of those engaged in this line of business to reduce the selling price of their commodities. This is, without question, a commendable move in the right direction. All are aware that one of the greatest obstacles in the way of the introduction of gas stoves has been the so-called high price. Gas stoves, like the gas to be used by them, will have to be sold at a figure that will tend to make their use a necessity and not a luxury. I feel confident in saying to you that I voice the sentiment of gas men in congratulating and thanking you for the move taken in the downward tendency of prices on your gas stoves.

The aim of gas men, members of sister associations as well as those of our own, has been to reduce the selling price of their gas to as low a figure as possible, consistent with a fair profit on the investment. As proof of this statement it is only necessary to call your attention to the news items published in our gas journals, where week after week you will notice that a reduction, more or less, has been voluntarily granted by some one or more of the many companies. A friendly rivalry had arisen as to who would be the first to reach the dollar line. Upon our Honorary Member from New England had been conferred the distinction of being the first to propose the dollar limit, and if any man outside of Ohio was to be the first to reach that goal, none other would please the members of this Association better than would President Harbison; but such was not to be the case, for, as usual, the Ohio man is ahead. It fell to a member—our ex-President, Mr. McMillin—of this Association to have the pleasure and honor of announcing to the consumers of the Company of which he is manager, that on and after May 1st, 1887, the price of gas to private consumers would be fixed at the rate of $1 per thousand cubic feet, and other Ohioans have since followed his example. Many others are hugging the dollar line very closely and fully expect in the near future to reach it. Some are at present selling at less than $1.25. We might safely make the statement that one-half the total product of all the works in the State is now being sold at $1.15, or even less per thousand.

We have prepared for this meeting a goodly number of papers on live subjects, on matters of great interest to the members of the Association, and I ask that you take sufficient time to discuss fully all the questions involved, for you are aware quite as many good points are brought to light in the after discussions as in the first reading of the papers. The members reading certainly then feel that their efforts and time spent in the preparation of papers have been appreciated, and there is an interest expressed when a lively discussion has been held. No matter if the members agree or not with the author he feels that his efforts have not been in vain. I wish to say to those who have prepared papers that I feel under a personal obligation to them for their kindness and courtesy, and take this opportunity to publicly thank them.

Gentlemen, in conclusion, allow me to express to you my acknowledgment for the distinguished honor conferred upon me in your election of me to preside over your deliberations at this meeting. I also ask you to please remember that as I have not had the experience of my worthy predecessors in filling positions of this nature, you will, therefore, grant me your indulgence for any short comings. The members will please be prompt in attendance at the hours named for the calling of the meetings. We are now ready to proceed with the business in its regular order.

On motion of Mr. Canby, a vote of thanks was passed to the President for his able and interesting message.

READING THE PAPERS.

The Association then listened to Mr. Geo. H. Christian, Jr., of Norwalk, Ohio, who read a paper on—

THE USE OF LIMA CRUDE OIL FOR CARBURETTING WATER GAS.

Mr. President and Gentlemen:—In this age of sharp competition and low price for gas great economies have to be practiced in its manufacture. We must use the cheapest materials at our command and adapt our methods of manufacture to them, especially so in water gas manufacture, where first cost of materials is the main item of cost of gas in holder.

We ask your attention, therefore, to a brief description of experiments, made in our works the past winter, to substitute Lima crude oil for naphtha. We began by mixing small quantities of this crude with naphtha, gradually increasing until we had a mixture almost clear crude, and experiencing no more trouble than from naphtha alone. The gas was improved in candle power, and as free from any smoke or tarry vapors as when using naphtha. We had, previous to beginning our experiment, begun a system of steaming out our works from the hydraulic to holder once every two weeks. This we continue to do, and by this means we kept our works clear and free from any stoppages or back pressure the whole winter. We also continued to clean out our stand and dip-pipes as often as once every ten days. We found that with crude, the same as with naphtha, a deposit of lampblack would form in these pipes, and unless they were regularly attended to they would set up a back pressure and cause us to burn the oil. We used the same heater for the crude as we were using for naphtha, but had, however, to change our method of handling the oil in the heater. We found that by leaving the crude oil in the heater between runs it became partially cooked and the heavy oil separated. This oil would make tar the moment it entered the generator. We remedied this difficulty by draining the heater between runs. We were also, for a time, troubled with a burnt-oil smell in the gas, which our consumers laid to the crude oil, and they began to cry down our use of it. We finally discovered that one of our valves to the heater leaked and allowed the oil to drop into the generator fire between runs; burning there, it left the smell of burnt oil in the brick, and the gas would carry this smell to the burners.

Our difficulties, as you see, were few and trifling, yet it was some time before we remedied them. These were all of our difficulties from handling the oil.

We, however, had another trouble caused by our using the crude, and that was from sulphuretted hydrogen, and we were not prepared to handle that impurity in the quantity which we found it in the gas from the oil. We tried lime purification for a long time, with very poor results. Having but one purifying box, we could only use about thirty bushels of lime to a charging, and this would last but a few days, even when it did its work. It would seldom last two days before the gas would blow holes through the lime, and pass through as foul as ever. We could never count with any degree of certainty upon the lime doing its work, and this necessitated the use of other material. We tried Connelly's iron sponge, and with excellent results. Since using this sponge we have had no sulphur troubles. We have one tray of the oxide, about fourteen inches deep, and every four or five days we lift our purifier lid and let it stand up over night. By this we find the sponge revived sufficiently to use again.

We have briefly presented our experiences with Lima oil. The results obtained from it could not be better. We use about 5 gallons of crude oil per 1,000 cubic feet of 22-candle gas. We think our success in handling this oil without experiencing tar troubles is due to our method of gasifying it. Lima oil, as you no doubt are aware, contains about 50 per cent. tar. This requires that the whole of the oil, the naphtha, distillate, and tar, should be immediately gasified, by using high heats in the generator and superheater. In this way much of the tar is made a fixed gas. The heavier carbon vapors remain in the

generator, forming gas carbon in the side of the generator, and the vapors of tar are condensed out in the hydraulic. Some of these vapors pass beyond into the scrubbers and condensers, and are here separated out. The oil should be passed through a steam heater before entering the generator.

Having a highly heated retort in the generator through which the oil must pass before entering the generator chamber is certainly advantageous, but there is danger from its clogging up with carbon forming in it, which necessitates its being so placed that it can be readily cleaned or removed. The oil should be forced into the generator so as to be sprayed into the hot brick of the generator, and not the fire. In this way you avoid making lampblack.

The outlet pipes from your superheater to hydraulic should be larger than the other pipe throughout your works, as whatever lampblack is formed will remain in these pipes and gradually fill them up. They should be arranged as in our works, so that the natural draught of the apparatus can be passed through them, and in this way burn out the lampblack formed on the sides. This method of cleaning them is quicker and more readily done than scraping them out. The hydraulic should also be arranged with large outlet pipes for cleaning; then, by steaming it at regular intervals, all the tar left there can be taken out or run into a well. In our works we draw down the water in the hydraulic every run, and we have kept our works beyond the hydraulic so free from tar that we use our iron oxide in our purifier without a bottom tray of sawdust or any material to catch the tar; and whenever we have taken out this oxide we have found it free from tar.

There are a number of points to be carefully attended to to make a success of using Lima oil. The oil should be carefully filtered when emptying. Its temperature in storage tank should not be allowed to go below 50° F.; and should your water gas plant require of the oil being admitted into the superheater, it would be advisable to steam the oil thoroughly before using it, ample time being given it to fully settle before using. In this way all the impurities in the oil, together with the heavy, dense oils, known as "B. S." oils, will be settled out, and you will escape trouble from tar and gas carbon forming in the superheated brick. The National gas oil of Lima, Ohio, is, we believe, prepared somewhat in this way, and excellent results are reported from works using this oil. You can also mix the crude with naphtha and rid yourself of tar troubles and carbons. By so doing the naphtha acts as a dissolvent, thinning out these heavy carbons.

There are a number of works in the United States using Lima oil, either alone, mixed with naphtha, or as prepared by the National Oil Company. The latter oil is used in Springer apparatus at Minneapolis, St. Paul and Chicago. California crude oil is also used at the Los Angeles works. In the Consumers Company at Chicago, the crude is mixed with naphtha, in the proportion of 66 per cent. crude to 33 per cent. naphtha. At these works they use the Lowe, Granger and Flannery processes. They also mix the oils at Dayton. In many of the latest improved plants the oil is introduced into the superheater. Whenever such is the case, arrangements must be had to readily change the loose brick in the superheater whenever they become covered with carbon.

It is hardly necessary that we should give you the saving in cost of gas, for you can figure this out for yourself. It does not take any more of the crude per 1,000 cubic feet than of naphtha, and the only item of increased cost is for purification. Where iron oxide is used and air admitted into purifiers when making gas, saving the cost of handling the oxide, this increased expense will be but trifling. On the other hand, the oil being less easily burned than the naphtha, a hotter fuel than hard coal, such as gas coke or Connellsville coke, can be used in your generator, and two or three runs taken from one coking, without danger of burning the oil and forming lampblack. In most places this coke can be bought at two-thirds of the cost of hard coal; and in the case of good Youghiogheny coke, it will go as far as hard coal pound per pound. The Connellsville coke will go further than hard coal.

In conclusion, we must highly recommend the use of Lima crude oil as being the best and cheapest material at our command to-day from which to enrich or carburet water gas. You can all adapt your works, by means of trifling changes, to its use. Do not expect too much, at first; and do not give up if, at first, you do not succeed. We do not know of another gas works using the clear Lima crude such as is shipped for fuel purposes; but have heard, however, that there were works using the crude alone. The works at Chicago that we have mentioned mix the oil with naphtha because they cannot put their several sets in natural draught often enough or long enough at one time to burn off the carbon on the superheater brick. This could be remedied by having an extra set for every three that are to be constantly in use. It will surely pay to invest in extra sets in all large works where thousands of gallons of oil are used every day.

We have in this paper confined ourselves to the use of this oil in water gas plants. We, however, cannot see why coal gas men should not use the Lima oil as an enricher in place of naphtha or cannel coal. Highly heated retorts into which the steam-heated crude is sprayed, and from which the gas is rapidly led or exhausted away, are all that is required. A fine jet of steam will spray your oil into your retorts, and also help to carry the gas away rapidly; but far better even than this in all large coal gas works is to put up a water gas set. Use Lima crude and your refuse coke from your coal works, and make 30-candle water gas to enrich your coal gas. You can then run higher heats in your coal retorts, get more gas per pound of coal and make up the loss of candle power with your water gas plant.

Discussion.

Mr. Critchlow—Mr. Christian says he is not aware of any other works than those at Norwalk in which Lima crude oil is exclusively used. I can say that there are other works, in Ohio and in Pennsylvania, which are now, and have been for one or two years, successfully using Lima oil exclusively in carburetting water gas, and in decomposing natural gas. Among these may be mentioned Bellaire and Wellsboro, Ohio, and West Pittsburgh, New Castle, Beaver Falls, Sewickley, Greensburgh, Connellsville, and Uniontown, Pa. In those places with the Lima oil they are getting as good results as they formerly did with naphtha. But the oil is used a trifle differently from the manner described by Mr. Christian. The oil, without having been heated previously, is sprayed above the fire. In many of those works not a gallon of naphtha has been used since the plants were changed to the manufacture of water gas, or to the adaptation of natural gas.

Mr. Murphy—I will add to the list the plant at Niles, Michigan, where, for eight months of the year, one man does the entire work, and I think, using the oil in the manner noted by Mr. Critchlow, he gets better results than Mr. Christian names.

Mr. Christian—Has any member of the Association had any experience in using iron oxide and revivifying it in the boxes. We find that in using the Lima oil we have to take into consideration the purification. Heretofore, when using naphtha and hard coal, we have had so little sulphur in the gas that it was passed on without any purification. Prof. Lowe, who is probably the father of water gas, thought nothing should be done but make the gas and pass it right out to the town—making it clean enough to use without any purification. Now, however, in using coke and Lima oil, we get as much sulphur from the oil as you get in your coal gas works. Very few of the works built some years ago have over one or two purifiers which they can use, and it is, therefore, necessary to use some material in purification which can be kept in the box for quite a while without being changed; as otherwise, especially in the winter time, they would be greatly bothered with impure gas.

Mr. Critchlow—At New Castle, Pa., the same purifiers are used that had been used with the coal gas. There are four 8 by 8 boxes, charged with the iron sponge, which is revivified in the boxes by carrying in air with a steam spray. The idea in using the spray is more especially to draw in the air than for the sake of any advantage to be obtained from the steam.

Mr. Christian—Is the steam condensed, or is it passed in simply as steam?

Mr. Critchlow—We let the steam go through.

Mr. Christian—Do you meter the air; or how do you regulate the quantity admitted?

Mr. Critchlow—We have a ¼-inch steam opening, the opening in the T that draws in the air being 1½ inches, which is sufficient to admit the air quite rapidly. We do not care to know what proportion of air we take in.

Mr. Christian—You do not pass air through when making gas?

Mr. Critchlow—No. We clean the sponge in the empty boxes while two of the boxes are at work.

Mr. Christian—In order to purify in that way you would have to have three boxes, at least?

Mr. Critchlow—Yes.

Mr. Christian—I believe, in some places in England, they revivify continuously—one or two per cent. of air constantly passes into the boxes with the gas. They claim it is a benefit to the gas. If you can get rid of the lime purification altogether, and, at the same time, get rid of handling your oxide, by being able to force air continuously through your boxes, you can readily see what an immense amount of saving in labor you will have.

Mr. Critchlow—But I do not know how you would do that when you

have only one box. I think Mr. Faben, of Toledo, who has been using the sponge, can give us some information.

Mr. Faben—We have been using a preparation of iron and sawdust almost continuously since 1873. I have no doubt that some of the original material is mixed in the charges that we are using to-day. For the last three or four years we have been passing about one per cent. of atmospheric air with the gas into the purifier, the idea having been first suggested to me by an article in the *Journal of Gas Lighting*. At first I passed the air in at the exhauster. I put on a steam syphon, drew in one per cent. of air and passed that in with the gas; but I did not get good results from this plan—I could not get strong ammoniacal liquids in the scrubber without the ammonia passing through. I then made a change, and introduced this steam jet and the air, under a measuring system, at a point after the scrubber, and just before the purifier. I put on a jacketted pipe in connection with the condenser, and condensed the steam vapor back to water. The result was very beneficial to our iron process of purification. During the summer season, when passing 250,000 feet per day, it was no uncommon thing to purify 10,000,000 feet without changing the boxes. In fact, when a change was made, it was on account of the pressure and not because of impure gas. The change in pressure was caused by a deposit of free sulphur. Sulphuretted hydrogen would be absorbed by the oxide of iron; and on admitting air to the latter free sulphur would be deposited, the nitrogen was liberated, and ammonia would be formed. Now, there is no ammonia passing the scrubber, but ammonia would be formed in the purifier, and sulphur deposited in a free state. The bi-sulphide of carbon passing along in the gas would dissolve that and run it out through the material to a point lower in the iron preparation, and cause the latter to become pretty solid. We would have to pick it out. It would come out in hard chunks. The illuminating power of the gas was improved by the introduction of the air, the cause for which ought not to need explanation. Having no data with me, I cannot give you figures, and can only state the facts in this general way. I have no hesitancy about recommending the plan to any who are using oxide of iron for purification. If they will construct some species of apparatus for introducing about 1 or 1½ per cent. of atmospheric air, after the scrubber and just before the entrance to purifier, they will get very beneficial results.

Mr. Christian—Does not the iron sponge become greatly heated?

Mr. Faben—No; we do not have percentage enough of the pure iron to cause that. We used about 95 per cent. of the sawdust and 5 per cent. of the iron filings; the whole mass being wetted down or thoroughly saturated with a solution of sulphate of iron. The iron was deposited until there was an iron coating on all the surfaces of the sawdust. Since that time we have just added to it each season. I washed out some of it in the fall, and found that the whole material contained only about 27 per cent. of free sulphur. As the quantity of sulphur increases we add a little more sawdust, or iron, as the need may be indicated. If there was too much iron we would add sawdust; if not, we would add a little more iron. The cost of the purification is a mere bagatelle.

Mr. P. J. Wood—What effect has the oxide of iron on the meters?

Mr. Faben—I do not find it to have any effect whatever on them. Nor do we find any deleterious effect on the boxes themselves. During the summer months, when the boxes are long out of use, we coat the interior of the covers with crude oil, and also treat the interiors of the boxes, while open and exposed to the air, to a good bath of crude oil. We carry about half an inch of oil on top of the water in the seal. Although the boxes have been in use since 1883, the clear iron is there to-day, and there is neither scaling nor deposit.

Mr. P. J. Wood—Probably some of the meter men can answer my question, for they get meters from works using all sorts of purifying material.

Mr. Murphy—From personal observation I am perfectly sure that gas purified by oxide has no injurious effect, *per se*, on the meters. Being familiar with the material used for purification by a great many of our customers, I am sure I would have noticed the difference, if any.

Mr. Faben—I will qualify what I have said. We depend upon the iron purification only for the sulphuretted hydrogen. We use one tray of lime for taking up the carbonic acid, and that is rendered a true carbonate. The sulphur impurities are all taken up by the iron.

Mr. Lindsley—Is that tray of lime in the same purifier?

Mr. Faben—Yes; one tray of lime below the iron. We use one tray (say about 5 inches deep) of lime, with about 20 or 22 inches of iron on top of it.

Mr. J. Gwynn—Our experience at Fostoria with Lima oil has lasted for ten months past. We have tried it with both water and coal gas. During the time noted we used nothing but Lima crude oil in the generator, and no trouble whatever is traceable to it. We do not heat it as Mr. Christian suggests, but take it directly from the tank and spray it into the generator with a steam jet. It works very nicely.

Mr. Tayler—I have been informed that at Sharon, Pa., where Lima oil is used, they have had considerable trouble with their gas—so much so that the consumers all over the town are complaining seriously of the bad odor from any small leak that may occur. They even say that the odor coming off from a burner in the instant between turning on and lighting the gas is almost sufficient to drive them from the room. I understand the main pipes are so coated interiorly that the leaks which formerly existed in them have been stopped up by the deposit. (Laughter.)

Mr. Critchlow—I think I can throw some light on the Sharon business. The Sharon folks had no money, and Mr. Shiras, who was formerly in charge of the works, was not a practical gas man. In fact, Mr. Crawford, who now has charge of the plant, says he (Shiras) knew nothing about gas. A water gas plant was put in there, but the purifiers were inadequate—I will qualify what I said about their not having money; they have money, but do not put enough of it into the works. The purifiers are not larger than 4 by 4, and if the boxes were charged with sufficient purifying material, the bulk of the latter caused too much resistance. Then they would blow holes through in order to get the foul gas out, and this has been, because of carelessness in the blowing operation, the reason why foul gas went out to their consumers. They would have had just the same trouble with naphtha.

Mr. Faben—If any coal gas man has been successful in using crude oil instead of naphtha as an enricher I would like to hear from him.

Mr. Evers—I have used Lima crude oil to enrich coal gas, and think it is a success. I did not spray it in with steam, but let it run in through the seal, admitting it after the charge had been in for three hours. We regulated it so as to have the gas of any candle power we desired, and I think we did it very successfully.

The President—Where did you drop this oil?

Mr. Evers—We lifted the retort lid after the charge had been in about three hours, and after the heavy pressure was off of the retort, allowing the oil to drop on a small bed of ashes or cinders, placed inside the mouthpiece.

Mr. Lindsley—You dropped it just inside of the mouthpiece?

Mr. Evers—About 4 feet from the mouthpiece. It makes an unhandy lid to put on, but I think it is worth the trouble.

Mr. G. S. Harris—Do you do it before you draw your coke?

Mr. Evers—Yes; and right on to the coke charge. We put two shovelfuls of cinders at the end of the pipe for the oil to drop on.

Mr. J. Bate—After making your coal charge you throw in some cinders?

Mr. Evers—Not until ready to put the oil in. You have to take the lid off to get the cinders in.

Mr. Lindsley—Would a pipe last, if put in that situation, without the oil passing through it?

Mr. Evers—We have to frequently change the pipe that passes through the lid. The feed pipe does not last long.

Mr. Witham—Would there not be trouble from stoppage in the pipe?

Mr. Evers—Yes; but the pipe is worn out by the time the liability to stoppage is reached.

Mr. Christian—This burning out could be prevented by keeping steam in the pipe. The pipe which runs into our red-hot generator will not burn out in six months; steam is constantly passing through it. It strikes me that a little steam running all the time through the pipe would not only preserve its life, but also keep it clear.

Mr. J. Gwynn—I would like to ask Mr. Faben about his troublesome experience in enriching coal gas with Lima oil.

Mr. Faben—I found the same difficulty in using crude oil that I encountered with crude naphtha; but it would manifest itself more strongly. In using crude naphtha there would be a deposit made up of hydrocarbon oils, of wide ranges of densities, and in the destructive distillation of the oil I got soot at one end, tar at the other, and probably got gas out of the heart of it. So, also, I found soot in one end and tar in the other, in the most marked manner, when attempting to use Ohio crude oil for enriching purposes. The quality of the gas that I got was all right, but I could not make it long enough. After a limited time of satisfaction we would have to tear things out and commence over again. I finally gave it up. When I used crude naphtha I found the same difficulty, but not in so marked a degree—I used a re-run naphtha, made at the Doane works in Cleveland. I am able to use a sufficient quantity of that to change the quality of the gas; and am able to adjust the heat in any one bench so as to use one portion of the bench for oil, and the balance for coal gas.

On motion of Mr. Coverdale the thanks of the Association were voted to Mr. Christian.

Mr. F. W. Day, of Columbus, then read his paper on

THE POLICY OF GAS COMPANIES AS TO INCANDESCENT ELECTRIC LIGHTING.

To the President and Members of the Association:—Allowing my confidence to be worked upon by our worthy Secretary, until I came to believe that all his efforts to obtain papers for this meeting were to be of no avail, enabled him to obtain from me a promise to help him in his hour of need. He would attain eminence in law, so untiring are his efforts as a solicitor. Had I known to what an extent they were to be successful, the list of papers would have been shortened by one.

In regard to the policy of gas companies as to incandescent electric lighting: The general inquiry for information is evidence enough of the importance of the subject. We hear on all sides the questions. 1. What effect will the introduction of an incandescent plant have on our business? 2. What amount of capital does it take to put in such a plant? 3. Can they sell *light* as cheap as we, and make money? 4. Are gas companies any more favorably situated for furnishing electricity than anybody else?

At the meeting held in Dayton one year ago you listened to two papers; one entitled, "Gas and Electricity: Two Interests or One?"* in which the operation of the gas and electric light business, separately and collectively, was discussed. The second paper had for a subject, "Gas with Electricity,"† in which the results of a year's experience in running gas, and arc light plants, collectively, were given, accompanied with many practical suggestions of much value to those who had the introduction of an arc plant under consideration. In fact the ground was so completely gone over that there is very little room left for saying anything new. However, the enormous sales of incandescent electric apparatus during the last year, together with the rapid improvement in the modes of generating and distributing the current, have added much that is of interest on the subject. We hear wonderful stories of a new system whereby the amount of necessary first investment in distributing plant is divided by ten, and, at the same time, the loss incident to distribution is reduced from 10 per cent., at a distance of one-half mile, to 2½ per cent., and no consideration shown to distance whatever. Verily, they sound like fairy tales. We might well ask, "Where is it to stop?" It would seem that the limits in these directions had well nigh been reached.

It is, I believe, very generally conceded—that, for some purposes, the arc light is far superior to gas. It has been frequently stated that the introduction of arc lights is accompanied by an increased consumption of gas in the immediate neighborhood where the arc lights are used, which increase is directly traceable to the presence of the arc lights. Will this be the case with the introduction of the incandescent lamps? I believe not.

The popular error that there were "Millions" in the lighting business, has given the incandescent promoters command of almost unlimited capital; and with what results? Two examples will suffice to show. The Edison Electric Manufacturing Company claim to have at the present time 68 central station plants in operation, supplying current to over 500,000 lamps, and representing an investment of about 12 millions of dollars, (much the larger part of which has been thus invested during the last 3 years), with many large unfulfilled contracts on hand. In this country the first plant running on the alternating system was put in operation in 1885. At or near the beginning of 1887 the Westinghouse people began to place that form of incandescent apparatus on the market, and in less than 8 months they had established 14 such plants, supplying current to 15,000 lamps, representing a capital of about $350,000, with contracts amounting to nearly $120,000 on hand.‡

In view of these facts is it not safe to predict that the same energy and push that characterized the locating of these plants will not rest until every town in Ohio, in the business portion of which 500 lamps could be placed, has been afforded the opportunity of using them? And if they are not furnished by the gas companies therein located they most surely will be by someone else.

Would a merchant be called enterprising who allowed a new article of merit, and in his line, and which he could have handled with profit, to be sold to a part of his best trade, to almost the exclusion of his own goods, simply because he refused to put it on the market—when he could have sold it at a less price, and at the same time made as large a per cent. on the capital invested as did the other man? On the contrary, I think he would be called "slow."

The skeptical will no doubt ask, "What has all this to do with us?" Let us see.

1st. The introduction of an incandescent plant into the business district of a town means the loss of the gas consumption of at least one 5-ft. burner for each incandescent lamp used.

2d. The cost of a plant would depend largely on whether the direct current 3-wire or the alternating system were used; and this, as also the cost of running it, would depend on the circumstances under which the plant was to be operated—the distance of the lamps from the station, the difference in the commercial efficiency of the generating apparatus, all coming in for due consideration.

We will suppose that the system requiring the least capital was embraced—we are told that the amount of investment, including land, buildings, steam plant, and complete generating and distributing apparatus erected and ready for use, would average $25 per lamp. Adding 10 per cent. to this as a factor of safety, would make a 1,000-light plant cost $27,500.

The third question requires more in reply. We will take, for example, a plant located in a town, the business portion of which would use 1,000 sixteen-candle lamps. With a 16 candle per 5-ft. gas, selling at $1.50 per 1,000 cu. ft., taking 4 hours as the average daily usage, the total consumption displaced per month would be $1,000 \times 5 \times 4 \times 30 = 600{,}000$ cu. ft., which at $1.50 per thousand, = $900, or an average of 90 cents per month per burner. Allowing for leakage a little less than 8 per cent., the net profit on the gas sold at that rate to pay 10 per cent. on the capital invested would be 55 cents per one thousand cu. feet, or $3.30 per month of 30 days. This would be the net reduction of the profits accruing to the gas business, resulting from the introduction of 1,000 incandescent lamps, if current was supplied from 6 P.M. until 6 A.M.

Now, suppose the lamps were furnished at the cost of a 5-ft. tip, namely, 90 cents per month, the income from the 1,000 would be $900 per month. No meters being used, the charging consumers with the cost of renewals of lamps, the company guaranteeing them to last 800 hours, would have a tendency to limit the hours of use to those specified in the contract; but they would still burn them more than they did the gas jets. Allowing 33 per cent. for this increase, and dividing the lamps and hours of use thus:

600	lamps	from 6 to 10 P.M.,	4 hours	= 2,400 hours.
300	"	" 6 to 12 "	6 "	= 1,800 "
100	"	" 6 to 6 A.M.,	12 "	= 1,200 "
1,000	"	total of.....		5,400 "

per day, an average of 5.4 hours per lamp per day.

They would cost, with a consumption of 6 pounds coal per hour per horse power, and an average efficiency of eight 16-candle power lamps per horse power, with coal at $2 per ton:

For fuel—

125	H.P., 4 hours,	= 125 ×	4 ×	6 =	1,500 lbs.(?)
50	" 2 "	= 50 ×	2 ×	6 =	600 "
12½	" 12 "	= 12½ ×	12 ×	11 =	1,650 "
Coal used for banking and starting fires,					350 "
Total.....					4,100 lbs.

4,100 lbs., at 10 cents per cwt.....	$4 10
Water, at 30 lbs. per H.P. per hour, = 2,664 gals., at 50 cents per 1,000 gals.....	1 35
Proportion Superintendent's salary.....	2 00
Engineer and station man.....	3 00
Fireman.....	2 00
Day watchman.....	1 65
Lineman and helper.....	2 50
Repairs to engines, boilers, and dynamos, at 5 per cent. on investment.....	15 00
Oil.....	1 00
Interest, insurance, and depreciation, at 16 per cent.	12 25
Taxes.....	60
Making total daily expenses at.....	$32 00
For average month .....32 × 30½ =	$976 00

The income being $900, this would make a net loss of $76 per month.

If placed at 90 cents for those used until 10 o'clock, at $1 for those used until 12 o'clock, and at $2.70 for those until 6 A.M., which would be the cost of a 5-ft. gas burner burned all night, the total income would be $1,060 per month, less $976 expense, would leave a net profit of $84 per month, or $1,008 per annum; a little less than 3½ per cent. on the capital invested. A plant under these circumstances would hardly be called a bonanza.

In cases where, as Mr. Wood suggested, the waste heats could be used to such an extent as to save 50 per cent. of the fuel, and the balance could be made up of coke breeze costing 1 cent per bushel to handle, the

*See JOURNAL, April 2, '87, p. 212.
†See JOURNAL, April 2, '87, p. 214.
‡Later information credits them with having, up to the present time, put in operation 85 plants, supplying current to 175,000 lamps, and representing an investment of about $5,000,000.

expense of firing would be reduced at least one-half, making the whole cost of production per day—

For fuel, 2,050 lbs., at 1 cent per bushel.....	$0 52
Other expenses	27 42
Total	$27 94

In round numbers, $28 × 30½ = $854 for average month. With an income of $1,060 and an expense of $854, we have a profit of $206 × 12 = $2,472, or nearly 10 per cent. per annum on the capital, as estimated by the Westinghouse people. By the operation of an arc plant in connection with the incandescent, some of the items would be divided, making net earnings considerably larger.

The cost as estimated here is, no doubt, larger than it would be placed at by the electrical engineers; but we had better err on the safe side.

The manufacture of a cheap fuel gas made use of in gas engines, together with the advantage of cheap and efficient storage batteries or accumulators, would lower considerably the amount of first investment, and, at the same time, cut down immensely the cost of production. However, it will not be long, now, until our energetic hosts will again be able to give us the benefit of their experience with their new venture, they being now engaged in putting in an incandescent plant.

It would seem, from the figures here given, that gas companes *are much more* favorably situated for furnishing both arc and incandescent lights, or *electric currents*, than anybody else; and that they should pursue the policy of fortifying themselves in their present positions by obtaining authority so to do—if necessary. Keep an eye on the public pulse, and if they *will* have it, *give it them*. By so doing they would make a powerful ally of what *might*, under some circumstances, be a formidable foe.

Failure to occupy a field of action in advance of others sometimes results in disaster.

Discussion.

The President—Perhaps Mr. King will tell us what the Jacksonville (Ills) Gas Company is doing with its electric light plant?

Mr. King—We have as yet had no experience with incandescent lighting, although we have been investigating it for the last month or two. I am, therefore, deeply interested in this paper, as it is well to hear both sides. The figures in the paper are entirely opposed to those lately received by us as to the profits we might count on. From my experience in respect to arc lighting, some of Mr. Day's estimates seem somewhat large. We entered the electric field with a view of merely holding our own, and with the feeling that we would be satisfied if we only succeeded in making our expenses, although the electricians thought we would do still better. Our experience with arc lighting has been contrary to our expectations, for it has been satisfactory in every respect. We accomplished all that we hoped to, and we have made a reasonable profit besides. Whether it will be so in respect to incandescent lighting, of course we do not know. Our Columbus friends have competition with incandescent lighting, and I am glad to hear from there that they favor gas companies adopting all forms of electric lighting in connection with their business. As we are now investigating the matter, I hope the discussion will be very full and complete. Among the figures received from electric men, is one estimate going to show a greater income from incandescent lighting in a certain district than we received from gas in that district, the latter being the best gas district in town. For instance, it is said the district would take so many lights, the income from which would be more than we are getting for gas. I think the man would have been disappointed if we had exhibited the figures.

Mr. Day—Did they have anything to go on, relative to what they could sell electricity for in comparison with gas in that district? Did you figure on the amount of consumption which gave you that income?

Mr. King—I did not go completely into the figures. The agent was there only a short time. He made his own figures as to the number of lights which would probably be used in the district. His proposition to us was based upon a certain number of lights, his estimated income from them being larger than we ever got from gas in that same district.

Mr. Faben—I think the gentleman stated it correctly when he said the income would be greater, and it is to be accounted for in this way. Wherever the incandescent electric light is resorted to there will be speedily a large increase in the number of lights used. Another feature was lost sight of in the paper, and so far in this discussion—the liability of large consumers, who would be a profitable class of patrons for the electric light company, to install their own plants. This they will often do. In the majority of instances, or where but one, two, or a dozen lights are used, a consumer cannot afford to put in separate plant; but in the case of hotels, where, say, 40 gas jets were used in the corridors, in the office and in the dining room, if an incandescent plant were put in, perhaps 200 lights would be employed. Storekeepers who try incandescent lighting are not satisfied with using one lamp where they did use one gas jet. No; they at once have two or three additional ones throughout the store, and all of the lamps are lighted; whereas when gas was used, not all the gas burners were used at any one time unless on the occasion of some unusual display. I think, in considering the question of incandescent lighting in competition with gas, this is a point that ought to be well looked into. I mean the likelihood that the large consumers (those who would seem to be the most profitable ones to the promoters of the enterprise) are very apt to put in their own plants. Such is the case in nearly every town. Take the town of Sandusky, for instance. Here a Westinghouse plant is being put in by the local electric company, while an Edison Company is also in the field; and it has been suggested that the city put in an isolated plant for the water works. The West House is putting in a plant, and it has been intimated by residents here that the proprietors of that hotel can earn money enough in supplying electric light to the people who rent the store rooms in their building to pay nearly the entire expense of lighting the hotel proper. The promoters of incandescent lighting in Sandusky will certainly get no profit from that quarter. If this is true in that one case, why should it not be true in other cases?

Mr. King—One of the first things I did was to visit the proprietor of our principal hotel—he was using six arc lights—to consult with him about it; he has always been a progressive man. The representative of the electric company figured on the basis of about $1.50 for gas. The hotel man said, "Let us figure this to see how it comes out. If I go into the incandescent business probably I will not want the light in many of the rooms; say in the parlors, the ladies' ordinary, and the dining room." He figured it out at the price mentioned by the electrician, at some $50 or $60 per month, and replied: "I will be paying $37.50 for arc, and $50 for incandescent lights—I do not suppose my gas bills will be any less; they were not with the arc lights—and I am paying you about $60 or $70 during the winter months. I thought I wanted the incandescent light, but now I do not believe so. I would not advise you to go into it, very much." As far as isolated plants are concerned, no doubt some places might be troubled with them, and I think it the part of wisdom to consider the question.

Mr. Day—One of our Columbus summer theaters or beer gardens contains an isolated arc light plant, operated by a gas engine, the total expense being about $31 per month. Practicaly, it requires no attendance at all. The gas engine and dynamo stand in a little glass-covered room to one side of the garden, and, of course, I watched the gas engine closely. From 6 to 8 Brush arc lights are on the circuit. Recently they said they expected to increase the number. All they have to do is to start the engine, change the carbons, and oil the bearings. There is no trouble, no dissatisfaction, no complaint.

Mr. Faben—The promoters of incandescent plants bring forth another seemingly strong argument as to the amount of money they are going to realize by supplying power. Of course I do not know how much money there would be in a small intermittent power, say one-quarter horse power, for sewing machiues, dentists' drills etc.; but I had some experience in looking for small intermittent powers, while looking for gas motors, and I found that the number of places where such power is wanted, but no heat, is very limited—there are very few places where power is wanted where they do not also want the heat which comes from steam. That power feature—of supplying elevators—is a very good one; if we can only get it. So far, however, it is somewhat like Col. Seller's eye-water—the water was good and cheap; and he might make money, if he could only sell it. It is the same with the incandescent power business. If they find a field and then occupy it, I have no doubt they can realize on it; but most men in looking for an investment for their money look for a field in which they can invest it successfully.

The President—I think Mr. Sherrard has had some experience with electric lighting in Steubenville.

Mr. Sherrard—Only an hour ago I became a member of your Association. Coming here to listen rather than to speak, I did not bring any data. I can promise you, however, that next year I will be better posted. We have an incandescent plant, established less than a year ago, which is furnishing many of the consumers who formerly obtained their light from us. They also have probably 150 or 160 incandescent lamps in the outskirts of our city. Whether the result is profitable to them I am not advised, except in a general way. We find some who, although very enthusiastic in establishing the plant less than a year ago, are now becoming disappointed and very anxious to sell out their interest, either to the gas company or to individuals. Some of the original directors declined to be re elected for a second year. This, to those of us who want scraps of comfort, indicates their business is not very profit-

able. We have a population of 15,000, and the gas works are competent to furnish all the gas that is wanted or needed by the people. We make coal gas only, having an abundance of coal which is taken from under and around the city. The whole region is underlaid with bituminous coal, in 4 to 5 feet seams, which yields a very good quality of gas. Therefore we can furnish gas cheaply and with some profit. The incandescent plant established within the year is able to compete with the gas company for the reason that its motive power is generated by natural gas, at a very cheap rate. I apprehend, with coal at $1.50 to $1.75 per ton, the power to run their plant costs in the neighborhood of $3,000, while we are informed that the natural gas suppliers only charge the electricians about $800 per year. I regret I have not access to the facts now, but hope in another year to have some figures of a comparative nature, showing what their light costs as against ours. Our company, probably, a year from now will introduce either arc or incandescent lights—perhaps both—and then will be in position to furnish the city with any desired kind of light. We have a complete gas works, and are furnishing the citizens with a very good article of coal gas. We do not use any enricher.

Mr. J. Gwynn—What do you get per thousand, and what is the candle power?

Mr. Sherrard—The price, as fixed by the city, is $1.50. The candle power is all of 16. We have no complaints about it except from old croakers.

Mr. J. Gwynn—What price is charged for incandescent lighting?

Mr. Sherrard—I cannot tell you positively, but I do know that they are furnishing it at various prices. They have no fixed schedule.

Mr. McCook—I think 75 cents per light per month is the rule; but they have, in some cases, a still lower rate.

Mr. J. Gwynn—What is the lowest rate at which it is supplied.

Mr. McCook—I think 62½ cents; but am not positive.

Mr. Sherrard—As they are in opposition to us there is not that unanimity of sentiment (although there is good feeling) which leads them to uncover to us all the facts we would like to obtain.

Mr. J. Gwynn—Have you any idea how many incandescent lights are supplied by them?

Mr. McCook—I cannot tell you. They also have arc lights. Mr. Sherrard proposes, however, that the number shall not be increased, unless they are furnished at a very low rate.

Mr. J. M. Bate—As Tiffin is not represented here to-day, I will have to speak of what I knew of it up to about 18 months ago, and for nearly three years, continuously, prior to then. The Edison people, coming there with a plant, proposed to revolutionize things—a first-rate article of coal gas was then selling at $2.25. They obtained sufficient capital to put up a $17,000 plant, wherewith to run 1,500 sixteen-candle power incandescent lights. They obtained their stockholders very promptly from among those who had been trying to buy gas stock; but the gentleman who owned the Gas Company having no stock to sell, they induced some of his rivals to put up $17,000 cash for a plant, which cost them over $30,000 when finished, and for which the Edison promoters drew the "hard cash." Then they began operations. By means of the Edison meter they were to sell electric light, as compared with gas, at a cost of about $1.50 per thousand. The lights put up in opposition to gas lamps were, in some places, as three to one. The results, in the shape of bills, as shown by those Edison meters, were simply astonishing. They very quickly threw out the meter system, and the local holders then sought to dispose of the electric light at any cost in order to get their money out of it—in the meantime the home Edison Company drew out and left the business on the hands of the Tiffin investors. Advances were made to the Gas Company to purchase their stock. I have it from some of the Directors (who spoke freely about the matter because they thought they were going to sell their stock) that they were $6,000 in debt at the end of the first year. At the end of the second year they acknowledged a deficit of $8,000; and just before I left I understood the indebtedness had increased to over $10,000. At the time of my leaving they were very willing to sell at 50 cents on the dollar, and admitted they had been disappointed in all the hopes held out to them. The consumption of gas during my time was not very much impaired. In fact the effect was in our favor, because a consumer who had 12, 14, or 16 incandescent lights, would oblige the man next door, who formerly used only a few gas jets, to about double his consumption.

Mr. McCook—Did they stick to the rate of $2.25?

Mr. Bate—The Gas Company did make a reduction shortly afterwards, but that would have taken place in any event, as the contract with the city called for a reduction at a specified time. I am now operating a gas works in a town where coal gas is sold at $1.20. They also have a 228 arc light plant, and are talking about putting in an incandescent system. The $1.20 rate was established by city ordinance. We were selling at $2; on the first of April, '87, we cut the price to $1.50, and put in force a system of discounts which made the net price $1.32. The City Council, however, has passed an ordinance obliging us, after June 1st, to sell at $1.20.

Mr. McCook—What do you get for street lamps?

Mr. J. M. Bate—$15 per year for all night lighting.

Mr. King—The remark about the Edison meter brings to mind a very important and serious consideration in connection with incandescent lighting. Undoubtedly, since Mr. Bate's disappearance from Tiffin such improvements have been made that what was then a failure might now be a success. At that time the Edison Company only guaranteed 6 or 7 lights per horse power, whereas now, from an isolated plant, twelve lights are guaranteed, and 11 from a central station. If this is not shown no payment is exacted. The serious thing, though, is the meter question—the getting at what is actually used. A few weeks ago I visited a city where incandescent light was used largely. On a very dark and cloudy day, while walking along one of the streets, the superintendent called my attention to the fact that wherever gas was used probably 2 or 3 burners were found sufficient; but wherever the incandescent electric light was used—it was not metered—every burner in the store was going. If during dark days the parties who use the light can demand that kind of service it seems to me a serious thing. Mr. Day touched on the matter when he suggested consumers are in a measure responsible, because they have to pay for their own renewals. To my mind the most serious question of the whole incandescent business is how to get at an equitable understanding as to the price to be charged. If a successful meter has been discovered we do not know of it.

Mr. Day—Electricians acknowledge the fact that, in order to make their business a big financial, commercial success, it is necessary to perfect a meter for measuring the electric current. Prof. Forbes is said to have one perfected, on the principle of heating a wire by the current. He presented it to the Society of Electrical Engineers at their recent meeting at Pittsburgh.

The President—I think that Mr. George Light, of Dayton, can give us some information on the subject of this paper.

Mr. Light—All I can say about it is that at Dayton they started off with a charge of $1 per month for each burner. A month's trial showed the thing to be a failure. At the expiration of the month, instead of removing the burners, additional lamps were inserted between every two electric lights, without any extra charge.

Mr. J. M. Bate—Mr. King spoke about burners being good for 800 hours; but it is a fact, according to what I have noticed in the two towns where I have been connected with the gas works, that for a time not exceeding a week an incandescent lamp keeps in pretty good shape. From that time on it goes steadily down, until, at the end of 30 days, it is just like a piece of red-hot wire. I do not see how a gas company can make money on a thing which deteriorates so fast. The people at Tiffin would not pay for renewals, and so the company had to stand that expense.

Mr. Denniston—I have had experience on both sides of this question. Some of it was like unto that of Mr. McCook—rather sad; the other portion—the buying out electrical plants—was not so bad. I was very much pleased with the paper. I take it we are all interested, in a business point of view, in finding out the best policy for a gas company to pursue. If it is in the interest of a gas company to go into the electric lighting business—if we can make more money in that way—then we all want an electric light plant, if we can get one. There are, however, so many things to change the method or manner in which we might look at this that it is hard to determine just what is best to be done. A great deal depends upon the surroundings. You may be in a large city with large business interests, and where individual plants can be erected and used; or you may be in a small place. I do not mean to say anything bad about the place which Mr. King represents. He knows the people—I am speaking comparatively now; and I ask, where you know all the people, where they know you and know you are endeavoring to do the best you can for them, and an opposition company is organized, is it, then, always the best policy for a gas company to put in an electric light plant? Mr. Day says if they are going to have it it is better for the gas company to put it in, which is true to a certain extent; and it is so also if an opposition gas company is to come along. If, for instance, he is making coal gas, and a water gas company should come along and offer to put in water gas for less than he can sell coal gas, what is it best for him to do? Would he not naturally say that if water gas was wanted he would put in a water gas plant himself? He will say so to the Common Council, or to the municipal corporation, and thus he may be able to prevent competition. Still, do you continue to have the good will of your people if

you do so? In the East End of Pittsburgh I have had a very lively competition. A few years ago we were selling gas at $2.50 and the electric lights were as high, comparatively. Now we are selling gas at from $1 to $1.30, and electric lights are supplied at from 35 to 75 cents per month each. If there had not been a very great improvement in the cost of incandescent lighting, as compared with the cost of gas lighting, and if there had not been as great a reduction in the cost of gas making as there had been improvement in electric lighting, I could not have remained in the place and continued in the gas business. I would simply have had to sell out. I could not have sold gas at $2, or $2.50 as against the present price of electric lighting—notwithstanding the fact (which Mr. Bate asserted and which I know to be true), that after running a little while you have got a loop of red wire, and not the 16 candle power light which they claim to furnish, and which you cannot get unless you renew constantly, or keep on increasing the power. From an economical point of view it is well for gas companies to consider (and I take it that that is the object of the paper) whether it is really good financial policy for them to put in electric plants themselves, or lose some of their customers, as I have done, because I could not put in an electric light plant and at the same time get the business that an opposition company could get. You know that human nature is alike all the world over; and Pittsburgh is not different therein from Steubenville or any other place. Where there is no competition you are apt to gain the ill-will of your consumers, and with every person with whom you may have any difficulty about a gas bill. A gas bill is so different from a grocer's bill, or any other kind of a bill. You may go across the street, or somewhere else, and find another grocer, if you fall out with the one you have been dealing with; but you cannot do so in the matter of your gas supply. Constantly making enemies, whenever a competing company applies, whether it is a gas or an electric light company, you will find plenty of people taking the other tack. They will take some stock. They will help the company along. They will pay more for the stock than they would otherwise do, simply in order to incite and aid opposition and competition. In that way capital is invested. They have taken from me in the East End of Pittsburgh from $8,000 to $10,000 per year. They supply stores, saloons, billiard halls, etc., which were large consumers of gas. I have noticed the very same thing Mr. King spoke of—in the daytime you will see the stores lighted up; and at night there are many more electric lights than there were gas lights. I am in the same dense fog with my friend from Steubenville in regard to the cost at which they can do this thing and still make money. Of course, as is often the case, if they have the Common Council or the politicians with them, and thus secure from the city a large amount annually for the support of their lighting company, or even if the amount so received will only pay interest on the cash invested, then electricity can be almost given away, and the consumers will be satisfied, for a while. By and by comes the time, however, when new dynamos and machinery must be purchased, and then comes the time when you can get the plant for less than it cost originally. This is so in one place where I am interested in the gas company, and where we bought the electric light stock for less than 50 cents on the dollar, after the plant had been run for about a year. The company was formed in the same way, perhaps, that ruled in many other places—by inducing people anxious for competition, to take some stock and put in some money. After they had "invested" some money where it would "do the most good," the city government pays up pretty liberally for a while, and the individuals follow suit, but after that the crash. When incandescent electricity comes in competition with $1 or even $1.50 gas, I am at a loss to know what they can do; although I do know some instances where electric light stock which suffered from competition with cheap gas had been sold out for much less than cost. In regard to Mr. Day's paper, I ask would it not be about as well for us to wait a year or two until they had expended their money, after they had worked up the plant, and had gotten hold of all the opposition which you have to your gas company and then buy it at fifty cents on the dollar, or less, rather than go in and buy an original plant ourselves? This has been done frequently, although I do not mean to say it is going to be the case where I am. Many things have to be taken into consideration in determining this question, one of which, for instance, is that certain parties will take largely of the stock of the competing company because, being interested in selling the machinery, they will put in the latter at a good figure and take stock in part payment. The boiler maker, the mason, the roofer, all will take stock. After a while, when the stock is assessed, and when they find that 75 cents per burner will not pay the expenses and keep up the machinery (because it will wear out, just like gas apparatus) then is the time to get your stock? I do not say that they are all in this way—I think there are exceptions, where they are really making money; but, as I say, unless the corporation of the city or town (or the politicians) be induced to take a hand, my illustration is a faithful one. I know the authorities of Pittsburgh are paying more for electric light than they paid for gas, and still are getting nearly as much gas as they did before. Those who have had any experience with the electric light will bear me out in saying that your gas sales are not very much reduced. As an actual fact, where you have been confronted by a competitor, you have been compelled to resort to economical means of producing and distributing gas, and were, therefore, able, as I am to-day, to sell gas for half what you did two or three years ago. In this way you are making a better gas and are selling more of it than you were three or four years ago. I take it, judging from my own experience, that your receipts show no diminution—mine were as great last year as the year before, notwithstanding cheap natural gas, and active competition of the Westinghouse people—thus showing we are able to hold our own. I may state that the Westinghouse people in Pittsburgh are among our best consumers of gas. While I am selling for about one-half the price I received three years ago, my net receipts are greater than at that time. If, however, the surroundings are such that you can make your electric light stock pay independent of your gas company, then by all means put in an electric light plant. But be sure of your course.

Mr. McCook—Have you any city lighting in the East End?

Mr. Denniston—Yes; I get $18 per lamp for street lamps.

Mr. McCook—Then the electric lighting company has not taken those from you?

Mr. Denniston—Not yet; although they are lighting a part of the old city proper. The men who run politics in our city have the lighting of the City Hall, Post-Office and nearly all the public offices, together with the engine houses, etc., which in my district alone, means a loss to our company of perhaps $2,000 a year.

Mr. Day—For several years, we have had in Columbus arc light plants that did not do a large business until within the last few months. A proposition looking to consolidation was made at one time, but instead of offering stock at 50 cents on the dollar they asked $2 for it, even with their small business. If any of you visit Columbus next summer, if the arc light is on the street, and the stores on High street are lighted with the incandescent electric light, you may imagine we do not sell any gas at all; but we are actually sending out 60,000 cu. ft. more per day this year than we did at this time a year ago. The incandescent lights introduced in business districts will have a great deal more effect on you during November, December and January than during the months of June, July and August, from the fact that the stores use a great deal of light in the winter time, before 6 p. m., whereas in the summer they do not use any at all.

On motion of Mr. Gwynn, a vote of thanks was given to Mr. Day.

Afternoon Session.

Mr. J. W. Alexander, of Painesville, introduced the afternoon session by reading the following paper on

METHODS OF INDUCING NON-CONSUMERS TO USE GAS.

Mr. President and Gentlemen:—I do not expect to give you anything new or novel in any methods I may advise to add present non-consumers to your list of consumers of gas, but merely to suggest, as briefly as possible, some plans which I believe will, if given a thorough trial, tend in that direction.

1st. The Lungren lamp, which I have found a great help in holding old as well as in adding new consumers to our register. We have bought about 40 of these lamps, and rent them to our customers at $2.50 a year, or 25 cents a month, and our experience with this lamp has been that it will develop more light, and a light of a more satisfactory nature than any other lamp that we have tried.

We have sold some lamps, made now by the Penna. Gas Enriching Company, called the Seibel lamp. They give good satisfaction. One hotel-keeper in our city put in a dozen or more in the hotel office and dining room, in place of oil lamps. The cost of this lamp is greatly in its favor, for they can be bought at the low figure of $15 per dozen. We have also put in a few albo-carbon lamps, but have not made any particular effort to push either of these two last named lamps; I think, however, that by selling them at cost many new consumers can be secured. Some parties using the Seibel lamp are using gasoline as an enricher, and claim to get, with less expense

and trouble, as good or even better results than those obtained from the carburetting material furnished by the makers of the lamp.

We have tried to introduce gas engines to parties needing power, but their high price so far has prevented the sale of them to our customers. With less than 300 consumers we have placed between 50 and 60 gas stoves for cooking and heating purposes, and this number we hope to increase largely by selling or renting only the latest and best styles, by doing all in our power to see that the users have stoves just suited to their requirements, by instructing them in their use and management, and by having them properly set up and conveniently located for the work they will be called on to do.

The one thing, though, which we have neglected more than any other, and the one that I believe will do us more good than anything else, is to advertise our business in the local papers—where we have had, unfortunately, too much free advertising. I never have yet seen an advertisement of a gas company in a newspaper calling the readers' attention to the product we have for sale, and the advantage of its use; but I propose to give this one, and, in my judgment, the best method, a thorough trial. We are not aggressive enough in keeping gas matters, especially new and modern lamps, burners, heating and cooking stoves before the people continually, and in working np new consumers. Stopped standpipes, leakage, naphthaline and the innumerable troubles that consumers know nothing about keep many of us out of sight of our customers, and but few of them ever see anyone connected with the gas company, except the meter takers and the collector.

Discussion.

Mr. J. M. Bate—Mr. Alexander remarked he had never seen in any paper an advertisement from a gas company. I have done some advertising, but never reaped any benefit therefrom, except from the large bills which the newspaper send us, thinking possibly in that way to even up with us on gas charges. Wishing to correct an impression that had gone out among our consumers, I had an interview with the local editor, who very soon afterwards sent in a bill that just balanced his gas bill. For 75 lines of printed matter his charge equalized a gas bill of $19. Whenever my consumers come to pay their bills they appear to be anxious to find fault with us and we ward off the attack by calling attention to our new styles of gas stoves.

Mr. Lindsley—Did I understand Mr. Alexander to say the cost of Seibel lamps was $15 per dozen.

Mr. Alexander—That is what they cost the gentleman who used them. They were made specially for him, being adapted to the use of gasoline enriching material instead of the material supplied by the makers of the lamp.

The President—I think Mr. Prichard can give us information on this subject.

Mr. Prichard—I do not know of anything in particular that would interest you. I find the best plan to keep your consumers in good humor is to treat them fairly. People often compare notes, and if a non-consumer finds that the consumer is satisfied at the way we treat him, we often get the former as a customer.

Mr. Lindsley—I think the day has long gone by when a man can come into a gas office to make complaint (I do not care how unreasonable it is) without being treated courteously, and his complaint attentively listened to. I think it pays to do this, if for no other purpose than to get in conversation with them. I know many instances where a consumer, in an extremely irritable state, would come to us evidently fired with a determination to have it out then and there. By listening to him attentively his ardor soon cools off, and, when having exposed the reason for his perturbation, a few words of explanation from you makes him your friend instead of an enemy In other words, he may be made to advertise you favorably. A hundred consumers, even very small ones, who are advertising a company favorably, are worth a good deal more than a like number who, although burning a good deal more gas, are advertising you unfavorably. I can illustrate this by stating the history of the Company's experience on one of our streets, the facts connected there with having occurred 18 years ago. The street was taken up before I had anything to do with the Cleveland Peoples' Gas Light Company, and for a year thereafter not a single gas consumer was returned from it. In those days it was the practice of the Company to have an agreement—a sort of contract—signed by those who desired to have gas introduced in a particular street, by which they promised to become consumers within a certain number of days after the mains were put in the roadway—of course, such conditions were neither inforced nor lived up to. This particular street, which was quite short, now returns us 40 consumers—at the time the gas was first laid on it should have had a dozen, but at end of a year after the mains were laid there was not one. The way it came about was this. A member of our Common Council who resided on that street, meeting me one day expressed a desire to burn gas, but was afraid of the expense. I asked him a few questions, and finally, at his request, went to his house and gave him an estimate of what I presumed he would burn. I told him he could exceed that amount—could double or treble it if he wished—but I believed that the amount stated would cover his bill for the ensuing month of October. The gas went in. Shortly after that he took occasion to congratulate me on having made a close estimate. The estimate was a little high as I intended it to be. The man was a satisfied consumer, and advertised the Company favorably from that time. Before the next season the dozen that ought to have been there originally, and a few more that came in afterwards, were on the books as consumers. It is now one of the best paying streets we have. I apprehend if the experience of the Councilman had been different, if he had been met in a different spirit, he might never have been a consumer. I hold that a certain measure of courtesy always pays exceedingly well; and that the breath so expended is not put forth in vain.

Mr. King—Across the water they are commencing to feel the effect of competition. They have to depend largely for their consumption upon a poorer class of people than we have to in this country—gas has been sold so much lower there that the poorer element could afford to use it; but just now they are suffering from the effect of cheap oil, which retails at about six pence a gallon. A discussion has arisen there as to how to retain not only the present consumption of gas, but to increase it, and a plan has been suggested for the purpose which may have some merit. It is by the use of what they call a "retail" meter. Instead of requiring a deposit, they place the meter for the consumer who burns only the quantity of gas that he pays for in advance. I understand this meter is somewhat on the same principle as the automatic scale, where you drop in your nickle and are weighed. The man drops a shilling into a slot in the meter, and the meter will then pass just so much gas. It seems that where the plan has been tried it has met with success. The advantage of the device is that instead of paying at the end of the month for the gas used in that time, he pays for it in installments, or as he pays for his coal oil. The poor man, therefore, does not feel it as much as he otherwise would. Another thought, which may be more applicable to large than to small companies, is suggested by Mr. Lindsley's remarks. Might it not be well for gas companies to employ a man to look after and to answer complaints? Would it not pay a large company to employ a man just for such purpose? Would not the returns be large enough to warrant the expense? Is it not a matter worthy of consideration?

Mr. Page—The automatic prepayment meter is something which attracted my attention about six weeks ago. I wrote to Birmingham (where the meter is manufactured and where it was first put into use) for particulars. I received on Monday last a reply, in which the writer says it has been very successful, so much so that the Committee on Gas of the Birmingham Corporation have reported favorably on its general introduction. A printed copy of the report of the Committee was sent to me. I noticed that the suggestion of the employment of such a meter caused several gentlemen to smile at the idea of putting in 25 cents at a time; and yet the consumer thus obtains exactly 25 cents' worth of gas. Of course we know that the gas meter is the fairest measuring apparatus that ever was made. We have no question about its honesty, even if the gas is prepaid for. I have no doubt the device will be generally adopted. A very large percentage of light now consumed in our cities, as all gas makers know, comes from oil, and yet that gas is cheaper has been demonstrated time and time again. Even in competition with oil at ten cents per gallon gas is the cheaper. Then, again; gas is not dangerous, while oil is extremely so. Kerosene has caused more loss to insurance companies than any other agency. The object with gas companies should be to reach that very large class of consumers—the poor people—who can buy a gallon of oil for ten cents, but who, if they deal with gas companies, must pay their bill (as few of them can) by the 15th of the month, or be cut off. Then, again; is there another branch of trade or manufacture which treats customers—I will not say disgracefully—with so little apparent regard for holding their patronage as does the gas industry? My Washington Market butcher never fails to send me, in January, a present of sweet-breads, or a spring chicken, or something nice. Why? It is because he wants to keep the

small amount of trade which I give him during the year. So it is with other trades. If a man who has been purchasing ammonia from me falls off, I find out why, and at once. If I find that I have lost the custom of a man because of any failure in the quality of the thing sold, or because of the impertinence of the seller, I will make it right with him, and get him back, even though I make no profit on what he purchases from me in a year. I cannot afford to lose a customer. I claim that a gas company cannot afford to do so either. You can afford to employ men to go from house to house in order to find out if the gas burners are all right—plenty of these very burners have been in use for 20 years, and he can readily carry a dozen or two new ones in his pocket, to replace those that have been worn out. I commend to your attention a paper* read at the last meeting of the New England Association by Mr. J. R. Todd, of Natick, Mass., who acts as Manager, Treasurer and Collector—he even charges the retorts while the workmen go home to dinner—for the Natick Gas Company. That is the kind of man for me. He does not lose any consumers in Natick. When electric light men come there and try to compete with him, they give it up. Why? Because Mr. Todd attends to his business on business principles. He not only has the confidence but the esteem as well of every gas consumer in the town. He looks after them. He always has some extra burners in his pocket when he goes about among his consumers, which he puts on where needed. He pays attention to the wants of the people, and is always on the watch to serve them. The Manhattan Gas Light Company, many years ago, learned that it was well to have a courteous man at the very entrance to their office; and so they employed a retired merchant, an old Quaker, at a salary of $5000 a year. He sits there day after day, and whenever a complainer comes in Mr. Quaker takes care of him or her mighty quick. He ascertains the cause of dissatisfaction, and does it in a most courteous and pleasant way. He says "I am here for the express purpose of explaining and correcting any mistake. We do not want a penny that does not belong to us." I think the best investment any gas company, large or small, could make, would be to employ a thorough gentleman—he need not be in broadcloth nor wear a silk hat—to go from house to house, not only among the consumers, but also among those who do not consume gas and canvass for customers, just as an Edison man came into my office in Wall Street last week to persuade me to put in the Edison incandescent light. He came to interview me; but I initiated the question series. I found out the Edison Company gave him a good salary together with 15 per cent. on the bills which the consumers he obtained would pay to his employers for the next five years. There is a pointer for gas men. We make more profit than the Edison Company, judging from the dividends they pay on their shares, and if they can afford to so pay their canvassers, certainly a gas company that earns at least five per cent. per annum can afford to employ a man in the same way. You want to look after your business and make friends of your consumers; because 99-100 of the gas consumers of any company are not in reality friendly to you.

Mr. J. M. Bate—Mr. Page is laboring under a delusion. His remarks may apply to the large companies, but if he were in charge of a small gas works he would find, if he did not keep his temper, and be always smiling, happy and serene, treating everybody pleasantly, that he would get left. I venture to say nine-tenths of the superintendents here are men who have to circulate about just the way he recommended us to try to do. We have to talk pleasantly. I can say that if I were to give a harsh word to a consumer, without a very good reason, or turned a cold shoulder to him when he made a complaint, our Company would not employ me any longer. I know from my experience in the gas business, that two-thirds of my labor is devoted to conciliating my consumers. I say this because I think Mr. Page does not seem to understand the duties of gas superintendents in small towns. I contend we treat our consumers much better than they are treated in large cities.

On motion of Mr. J. Gwynn, a vote of thanks was given to Mr. Alexander.

Mr. E. C. Gwyn, of Springfield, read a paper on

THE FIRST COST OF GAS STOVES AND ENGINES.

Gentlemen of the Ohio Gas Light Association—The subject assigned me could undoubtedly have been handled with much more force and profit to the Association had it been given to some one of larger resources and less limited experience than myself; nevertheless I have some opinions on the subject and shall express them to you as clearly as possible, although somewhat briefly. The introduction of electric lighting is in many cases making more or less encroachment upon the business of the gas companies, if not in cutting down the output of gas, compared with past years, at least in preventing that increase in output which should come from the natural growth of the city or town where the works are located.

Better and cheaper gas, improved burners and lamps for burning it, are things that are assisting gas companies greatly in keeping up with the demand for more light, and enabling them to hold consumers which they could not with the old system of burners; but with all this, I think our greatest field for increased business is to be found from the encouragement of the use of gas for fuel and power; and one of the first things standing in the way of these uses is the first cost of gas stoves and engines.

It may be said by some that this is no valid objection or hindrance, because people have to buy stoves for burning coal and wood for cooking and heating, and why not gas stoves? To this I answer that all housekeepers are supplied with some sort of cooking and heating stoves, and a large majority have a gasoline stove. Now, to induce them to burn gas for fuel we must get them to buy a gas stove, and if they already have a gasoline stove they must lay it aside, or sell it at a sacrifice. The next question is, what is the new gas stove going to cost them? You answer that one for their use would cost 20, 25 or 30 dollars, as the case may require. They think it over, figure what they can get for the old gasoline stove, compare the cost of running one with the other, and finally decide not to buy. Now, I think if we could say, when they ask the price, $10 instead of $20, $12.50 instead of $25, and $15 instead of $30, that we could induce *three* to invest at the latter price to *one* at the former. In other words, if we could furnish all the appliances for burning gas for fuel and power at the actual net cost of manufacture, we could increase our output for those purposes at least 300 per cent.

Then, again, if the cost of stoves to gas companies was reduced to actual cost of manufacture, they could in many cases rent the stove at a very small monthly rental, when parties only wished to use them for a short time. The rent received would compensate for the wear and tear, and the sale of, perhaps, several thousand feet of gas be made, which would not otherwise have been sold if the rental was based on the present price of stoves.

In regard to gas engines, the first cost is the only argument, in my opinion, that can be used against them—when only a small amount of power is required, and *especially* when that power is required *intermittently*. It is no trouble to prove to a person looking for a small, cheap motor, the economy of a gas engine over a steam engine, and to thoroughly convince him of the fact; but it is another thing to get him to pay double the price for a gas engine that he would have to pay for a steam engine of the same power.

The problem of furnishing gas engines to consumers at cost is a much harder one to solve than that of furnishing gas stoves at cost; and for the reason that there are very few first-class, reliable gas engines on the market. Those of the desired nature are covered by patents which would, perhaps, require too much capital to control. The same difficulty, however, does not exist in regard to gas stoves. There are many good designs and styles of gas stoves on the market, and, if patented, the right to manufacture one could be purchased at a nominal sum.

Now my plan is, briefly, that the gas companies represented in this Ohio Gas Light Association form a stock company, called, say, the Ohio Gas Stove and Engine Company with an authorized capital of $ — —, to be subscribed for and taken by said companies, pro rata, in comparison with their annual output of gas. To illustrate. Say the capital stock was to be $50,000 and the total annual output of gas of the companies composing the stove company was one thousand million feet, then a company whose output was fifty million feet, or one-twentieth of the whole, would have to subscribe $2,500, or one-twentieth of the stock.

The company would be managed by a board of directors, elected by the stockholders, who would appoint their manager and office force to conduct the business of the manufacture of gas stoves, or gas stoves and engines, as the case might be. In order to get a good style and pattern of stove to make, bids could be received for furnishing to the company the best stove and the right to manufacture it, or a sum could be offered for the best stove, with the right to manufacture it. In this way a first class stove could be obtained at a reasonable price. Then equip a factory and manufacture stoves on the most improved and economical plans, and furnish them to the members of the company at actual cost, without adding any-

*See JOURNAL, *ante*, p. 143.

thing for interest on the investment, and to customers outside the company at a manufacturer's ordinary advance for profit.

This plan, properly carried out, would enable the gas companies interested to furnish to their customers gas stoves at first cost, and I am satisfied that the cost would be so much lower than is the rule at this time that we could, in many cases, afford to give a stove to a prospective large consumer as an inducement, and make it a handsome investment to the gas company.

How these ideas of mine may be received by the gas stove manufacturers I will not pretend to say, but I am sure that when understood by the "*Dear People*," the plan, as outlined, will not be classed as one of the *trusts*, and with my conscience clear on that score the foregoing is respectfully submitted.

Discussion.

The President—This is a topic in which we are all deeply interested, and I hope it will be discussed fully. I think Mr. McMillin can give us some ideas on the subject.

Mr. McMillin—This is certainly a novel suggestion. I think Mr. Gwyn is mistaken in supposing for an instant that people will not regard it as one of these awful "trusts" now being formed all over the country. I believe an attempt to organize it would meet with about the same failure as has the attempt to organize protective asciations among gas companies. As gas-managers we are a unit—for one day only. Generally, when we get together in our Association meetings, we can agree on almost anything; but when we get home we do not continue in the same unified state. I do not believe it would be practicable to get up such an organization as is suggested. If there were any extraordinary profit in the manufacture of gas stoves more people would be going into the business, thus cutting down profits by reducing the prices. They offer a good round discount to gas companies, but I think most of the gas companies give the discount away. We have gone into the business at Columbus and sell the stoves at cost, and I presume most gas companies are doing the same thing. I do not understand why stoves cost so much; yet the fact that we have a number of gas stove makers in the country in very strong competition with each other, does not seem to have any very appreciable affect in reducing the price. I doubt if we adopted the plan suggested whether we could save any very large sum on the sales of the stoves. As to gas engines, I am not so clear. I am quite sure this "trust" could not sell gas engines to the companies at such a price that they could afford to give them to their consumers; they would have to sell them. The Otto gas engine, which has been generally adopted, is so expensive that the price almost precludes its use. We have had the agency of the Otto engine in our city for the past six months. We have canvassed for it very thoroughly. We not only offer to give away our commission and to put in the piping free, but sometimes offer to make an extra discount, yet we have succeeded in selling only one. There are, however, quite a number in use in our city which were purchased before we took the agency. I saw recently a circular issued by the National Meter Company, who advertise a gas engine and pump, on the same bed-plate, for $100. I do not know how great a discount they offer to gas companies. It is said to be a one-horse power engine. I do not know whether there are many in use, but assume not, or I would have heard of it before. In fact I do not know it has even passed the experimental stage. I at once wrote for particulars, and shall soon know whether it is good for anything. The Philadelphia people ask, I think, $250 or $290 for a one horse power engine, without the pump. We have a great many inquiries for small engines. People who build houses away from lines of water mains, or in places where the water pressure is insufficient to reach the upper parts of the building, require a small pump to drive the fluid to the storage tank beneath the roof. We have inquiries for such pumps, but when we state that a one-horse power engine will cost $290, and they will have to pay for the pump in addition, no sale is made. If this company can manufacture a one-horse power engine and pump for $100, perhaps they can manufacture a one-horse power engine alone for $75, perhaps for less. It seems to me a gas engine can be made for much less money than the Otto type is sold at—whether it will be as good remains to be seen. I am interested with some parties who are getting up a gas engine—in fact 2 or 3 have been made which the builders say will cost about one-third or one-half the sum charged for other engines.

Mr. J. Gwynn—I will say if Mr. McMillin had suggested this when he was in Fostoria a few days ago, I could have shown him one of the National Meter Company's pumps. The pump as it stands in our office occupies a space 18 inches in length by 12 to 15 inches in width, and weighs probably 75 lbs. It is a very frail piece of machinery, almost as much so as a watch, but despite the frailty of its bearings and construction, it does light work very nicely. It would do for a dwelling house, where only a small quantity of water was to be pumped, but if asked to raise large quantities continuously, it would likely be found inadequate. It is quite similar to the hot air engine. If too much oil is used on it, the cylinder becomes gummed and greasy, whereupon the engine has to be taken apart and cleaned.

Mr. McMillin—Does not the same rule apply to the high-priced engines?

Mr. J. Gwynn—The high-priced engines can, without skilled labor, be kept running in dwelling houses. The National engine might do where only a moderate quantity of water was to be pumped, but not otherwise. This which I speak of can pump from 180 to 225 gallons of water per hour. Its net price is $75. The Fostoria engine has been running in the Governor's building for about a year, and is still doing very nice work. There is, however, one serious objection to it. It is noisy, and you can hear the jar all through the building.

Mr. Murphy—It occurs to me there is no more profit realized to-day in the gas stove business than in the gas business generally, which, as you all know, is very slight. A matter lost sight of by Mr. Gwyn in respect to this general introduction of gas stoves, is the slow way in which gas men take hold of the business. They do not seem to have what is called out in our western country the necessary "get" about the business. If through their efforts to introduce stoves they enabled gas stove manufacturers to increase their sales the cost could be reduced. The gas stove as made to-day is cheaper than any coal range.

E. C. Gwyn—The paper was not intended to reflect on the undue profit reaped by the stove manufacturers. My idea was that the gas companies should get the stoves at cost, no matter what it was; that it should be a part of their business. There is no doubt the high cost of gas stoves interferes with their more general introduction. I know by experience that an ordinary sheet iron gas stove costs as much as a good-sized cast iron coal stove. Whether it costs more to make it, I cannot say; but I know if we could sell gas stoves cheaper we could have sold more—although they were sold at actual cost, not even the freight being added, and were set up free; yet even then, the price was a drawback.

Mr. Prichard—Recently one of our stove manufacturers declared a 15 per cent. dividend. My experience shows we pay about two-thirds more for gas stoves than for coal stoves. I paid but $8 last summer for a coal stove for a small kitchen; whereas a gas stove, taking the same weight of castings, would have cost $50 or $60. If they can make 15 per cent. dividend at that price some one must pay a large profit on the cost. During the last year they raised the price on the stoves which I had been selling, consequently I will not buy any more from these parties. Ordinary castings are made at Ironton for 3¼ cents per lb.

Mr. Graeff—I am afraid Mr. Gwyn, when saying that gas companies ought to get down to the first cost of gas stoves, did not exactly realize what that cost may be. I am not a gas stove manufacturer, and my experience in that direction has been brief, although I have had some. I was a few years ago connected with a gentleman in the gas industry who got the idea in his head that gas stove manufacturers were making too much money. So he made up a little "trust" of his own, composed only of himself, and he set about making a cheap gas stove. He went through the whole business, and made several hundred of them. He kept the money, and although I only got the benefit of the experience, I would rather have the experience than been compelled to pay the money. It costs more than most gas men suppose to make what is, comparatively, termed a small quantity of a thing. Gas men have an idea, when they send in an order for 15, 20 or 50 stoves, that the company to which they send it is getting an order for a similar number from every gas company in the country. Well; it is not so. If the gas companies could build up the business in gas stoves so that they could send large orders to the gas stove manufacturers, they would soon find prices tumble. I do not think the prices are as high as they were a few years ago, and I am satisfied gas stove manufacturers realize the fact that high prices are keeping sales down, and are doing their very best to cut their charges down. One very evident reason exists why an ordinary coal stove can be sold at a lower rate than a gas stove. Where a gas stove manufacturer makes a stove of a certain pattern, selling probably 500 from it, the coal stove manufacturer will probably sell

5000 from one single pattern. We have coal and wood stove manufacturers in the country who are, I am satisfied, spending more money in advertising than the 15 per cent. profit would amount to on the busines of any gas stove manufacturer we have. They do this because they can spread them into every section of the country. They go into every hamlet where coal or wood is to be had; whereas, the gas stove manufacturer has to limit his sales to gas towns only. And there is yet another thing—I do not know how it was in Ohio, but I know the question was broached in another section of the country some time since. One gentleman whom you all know, has been actively engaged in a quiet way in endeavoring to get up a gas stove company of his own, because he thought too high prices were paid. When he endeavored to get some guarantees from companies as to how many stoves they would buy in a year, and attempted to figure up what the patterns would cost him for the different sizes which he would be compelled to make, he gave the matter up. I think any attempt made in Ohio, or in other States, in that same direction, or even a general union among all the gas companies, would meet with very much the same fate. It would require too close a union. I am satisfied there are men here who know more about this subject than I do, but they do not seem willing to say so.

On motion of Mr. Graeff, a vote of thanks was tendered to Mr. E. C. Gwyn.

Mr. P. J. Wood, of Wilmington, followed with a paper on

THE MANAGEMENT OF SMALL WORKS.

Mr. President—Our worthy Secretary and the Committee appointed by you to select members to prepare papers for this meeting, made a mistake when they requested me to present my views on the management of small works. I need not say to you there are others who could have treated on this subject in much better style than myself; but, remembering that other and more valuable papers are to be read to you, I will occupy only a few moments of your time.

A well-regulated gas works should be kept as neat as possible, and there ought to be a place for everything with everything in its place, because no one can say at what hour of the night he may be called upon. At such time it may be necessary to use a certain tool or tools, when, to avoid delay which may occasion an accident, it is requisite that the needed articles be where you can lay hands on them, even in the dark. Again, the place must be kept clean and free from rubbish, so that in case anything happens in the night you may travel about without fear of falling over one obstacle or another, or occasionally wading in tar. In some works recently visited by me such impediments can be witnessed. About nine out of every ten explosions reported as having happened here or there are caused either through ignorance or carelessness: yet "mystery" is put forward for all blame.

Personally, I know of "mysterious" cases, one of which—the destruction of a large gas holder—cost the loss of a life and thousands of dollars, while a second man barely escaped with his life. Experts said friction was responsible for the explosion that wrecked the holder. May be it was; but I differ from them. It was carelessness, or rather ignorance on the part of the man who just saved his head from the wreck. I afterwards found that a lighted candle was the shape assumed by the mystery. Just so with the cause of the other "mysterious" happenings about a gas works. There would be no mystery if the truth could be got at.

As most of you are aware the superintendent of a small works has many duties to perform, and comes in close contact with all the citizens—both consumers and non-consumers—of his town. He, therefore, has vastly more to contend with than the superintendent of a large works. In a small town, if a lamp blows out in the night, you are sure to be told of it in the morning by some one who is quite likely to add that the lamp had not been lighted at all. To keep the good will of your informant you must pretend to be under many obligations to him for his kindness. In case you omit this, the next time he makes a similar discovery he will not tell you about it, but at the next meeting of the town council he will be on hand to complain against the gas company. Some parties take great delight in getting the councilmen at loggerheeds with the gas company, but they will not as a rule, persist if you treat them kindly, and seem to let them have their own way. This style of treatment does away with many complaints. In fact, as a general thing, complaints emanate from non-consumers who are the first the gas company, and are ever anxious to regulate the price of gas in the cities or towns in which they reside. On the contrary, the consumer seldom acts in this way, provided he has always been treated fairly by the company, or the company's manager or superintendent.

When taking your monthly statements, if the consumer says his gas does not burn properly, and by fixing the thing at fault at once, you accordingly convince him that it was the burner or fixture which caused the trouble, instead of the bad gas that he had been "cussing" for a week or more, he will, when hearing later on some one "cussing" the gas man, at once defend you.

To be a superintendent or manager of a small works, a man must be able to do almost anything, from digging a ditch to acting as stoker; and from the latter he must rise to the dignity of a machinist, who can, if necessary, repair any article about the works, even to the meters. In case a meter gets out of order, the defect is easily remedied at the start, by a few minutes' work; whereas, if not then attended to, dollars will have to be expended on it later on. I have no doubt some meter men will say that meters can only be properly repaired in their factories, but such is not the case. What is a meter? Nothing more than a piece of machinery constructed on scientific principles, the same as an engine or a watch, and manufactured by responsible parties. Why should these instruments be not repaired by their owners, provided they know how, and have provers with which to test their correctness.

Having been in the employ of gas works builders for a number of years, and having been in many works, both large and small, I can say as a general rule, that small works, as constructed, are far too small. If engineers and contractors would only recommend to or insist upon those who contemplate the erection of gas plants that nothing less than six inch connections be thought of, we would not be troubled with so many stoppages in our small plants. I can assure you that here is to be found the source of one-half of the difficulties in small works.

Not being versed in the mysteries of chemistry, I am unable to say that naphthaline always causes our difficulties; but I do know that if you do not clean out at least once every three months, stoppages are sure to occur. At least so I found it.

I believe that small connections, with so many L's or bends for the gas to encounter in its passage, grant too many chances for a lodgment finally ending in a choke. When taking out pipe, while making alterations in different works, I always found that small pipes would contain greater deposits of tarry matter than would be the case in larger sizes. What is the cause of it? It is the same with the service pipes. I make no doubt some of you have tapped a street main and found it free from deposits of any kind, but on taking out an old service pipe leading from it, you have likely found both L's—at the main and at the lamp post—closed up with a deposit, although the pipe itself was perfectly clear.

I would like to say more, but would have to go into details. Not being able to give figures with facts at the present time, I will close, gentlemen, by thanking you for your patience.

Discussion.

The President—We have not heard from Mr. Coverdale to-day.

Mr. Coverdale—It strikes me that meetings like this are doing more for the successful management of small works than anything else that could be done. I believe that the first thing is to educate the Presidents, Secretaries and stockholders of your companies, for if you get them to take an interest in the business a long stride towards successful management will have been made. In many works that I know of the proprietors have no regard whatever for their superintendent. If he wants anything they tell him to get along without it, for having got along without the article so far, he can continue to. When at a gas works some time ago I saw a man in the purifying house dipping tar out of the purifiers with a quart tin—in order that it should not run down into his pipes, he put on a flange with a nipple standing up about three inches high. The purifier was full of tar, which he was dipping out and putting it into a barrel that stood on a wheel-barrow, which he afterwards wheeled out and emptied its load into the tar well. I said, "That is a pretty hard way to do it; why don't you get something to stop that tar? "Oh," said he, "there is no use of talking to our company; they could not afford that." Now, if the officers and stockholders of gas companies attend our meetings to hear what is said about gas manufacture, and comprehend the quantity and style of apparatus necessary to successfully manage even a small work, I think they will more readily listen to a superintendent when he asks for something to enable him to do exactly what he ought to do. While visiting in New Mexico last year I urged one or two of the superintendents there to come to the meetings of the Western Gas Association. I said, "Why don't you talk to your company and have them send you?" The answer was, "They would not pay our expenses, and we could not afford to travel

so far on our own account." I afterwards spoke to the President of the company about the matter, but do not believe I made much of an impression upon him, although I urged the value and advantage of such a course. The final outcome of the conversation was that two of these superintendents visited at their own expense the meeting of the Western Association. Of course, as we all know, the successful management of small gas works depends upon getting people to burn gas; and how to get them to burn it is the question. Sometimes it seems to me that whatever we do does not advance us in the favor of consumers, even if we take quietly all the abuse given us. Still it is absolutely necessary that the managers of small gas works should take very much of that abuse. If you have a superintendent with dignity, and who believes he is a gentleman (every man in the gas business ought to be a gentleman—most of them are; but some are not quite so much so as others) he may get along. In talking about the management of gas works, of course I do not mean the mechanical management alone. You require to know how to keep the gas works running, how to get in the most economical manner the most gas out of the coal, to be able to recommend to the management the best kind of gas apparatus to be used, to say whether they should make fuel gas, produce of gas, coal gas, or anything else—the manager is supposed to come here and learn how to explain all these matters intelligently to his company. We hear a good deal about gas being sold at $1 and $1.15 per thousand, and I believe that we will all come down to dollar gas before very long. Some few years ago, as you all remember, we made a good deal of fun of Mr. G. B. Burns when he read his paper on water gas,* I believe I said then we had better investigate before we laughed. Since then a great many water gas works have been built, and many more will be built. It was just so with the natural gas. When they were able to show you how to use it, as we saw, for instance last night at Tiffin, the hint was taken advantage of. We must use all the means we can to get consumers. I have an idea that in introducing gas stoves, and in managing works so as to increase the consumption of gas we are accomplishing this end. I know in many towns that I visit, where stand works that I built, you can find stretches of streets half a mile long perhaps, with only here and there a man who uses gas in his house. You can go around a whole square, at the end of which journey perhaps you will have found another man who uses gas, and with only one lamp post between. You will find that on a mile of pipe not more than 10 or 15 people are burning gas. Now, suppose you talk to the non-users, or employ a man to ask them why they do not become gas consumers. If they answer that they cannot afford it, suggest that gas is cheap at the rate. Tell them that a gas stove will do their cooking for less than it could be done with coal, not forgetting to mention the incidental advantages springing from the cleanliness of the operation. If this is followed by the exclamation, "Yes; but what will it cost to do that? You have to put in pipes. How much will that be?" and you say, "$10," do not be discouraged on hearing, "Why, I can burn coal oil for two years and it will not cost me $10." No, go at him again in a month or two. I believe to-day that there is not a small gas company in this country but can afford to spend $1,000 in piping 100 houses free, if the owners will agree to burn gas. I feel that would be one of the ways to increase the consumption of gas in small towns. Of course the price of gas has much to do with this. About two years ago in a certain works the gas rate was cut down 75 cents per M., but at the end of the year the net receipts were about $400 less than they were before the rate was cut. January a year ago a 50-cent cut was made, and on the first of this year the net receipts were just $980 in excess of what they had ever been since we controlled the works.

Mr. Cantine—I represent the Alliance Gas Light Company. We have a small gas works in a small town. I am an advocate of low prices. I believe, as said by one of the gentlemen a few moments ago, that we will have to come to dollar gas. I believe we can sell gas pretty close to the dollar rate in most Ohio towns. Companies more remote from the coal fields of course are excluded from that statement. We get coal cheaply from Pittsburgh, and our rates of freight are moderately fair. We formerly paid $1.40 per ton for freight, but now pay only 90 cents. It is charged that I am the only one in our part of the country who is pleased with the Inter-State Commerce Law. I am certainly pleased with that feature of it, because the saving of 50 cents a ton in freight is quite an item. We were selling gas a few years ago for $3 a thousand; and others in that locality were selling at about the same price. We reduced the price from $3 to $1.80, and with the best results. We made more money that year than we had ever made before. In fact the reduction was forced upon us. We were losing our consumers; and all the polite talk, added to all the nice burners that we could put in, would not prevent it. The worst competitor of a gas company is oil—not because oil is so cheap, but because people in most places buy it from their grocers, and having it "charged," they really don't know anything about what it costs. It is but rarely that a man can tell you whether he uses 3 or 10 gallons of oil in a year. He pays each month what he can on his grocery bill, the balance going over to the next month,—he rarely makes a final settlement. The fact that oil proves our worst competitor is, I think, due more to that mode of dealing than to the cost of the article itself. We were, two years ago, compelled to become competitors of ourselves. The Fort Wayne Railroad Company have large yards in our town—the Cleveland & Pittsburgh Railroad is in the same system—and we have some large shops and hotels. The railroad superintendent asked us if we would like to go into the electric light business. It was a little new to us, but we saw the point directly, and found that in order to keep our business at all we would have to do it. Here was a very good consumer, who would take at once 20 lights. So we went into the business, and have added to it ever since, until it has now become quite a feature with us. Almost all who are engaged in the gas business are like the general managers of railroads—exceedingly conservative: they do not like to make any changes in the business. As a general thing the only interest which the directors and the stockholders feel in the business concerns the dividend they get. But rarely do they exert themselves at all to give the managers any assistance in the way of getting or keeping consumers—in some cases they really retard you. Sometimes you will find a stockholder who will say to his neighbor, "You had better stick to oil; gas is too expensive. I have stopped using it." Now, that is exceedingly discouraging to the superintendent, or whoever is in charge of the company. He must get along the best he can with the material at hand. These men are generally those who have gone into the company under the promise of some one that if they would assist in organizing a company, 10 or 20 per cent. profit would be paid right off the first year; that it would pay better than National Bank stock. Having been disappointed in not getting such dividends, they feel a little sour towards the company, and never give it the assistance that they should. With regard to gas stoves I may say that we have used a good many of the McDonald cheap variety. You buy a single burner for $1; two burners for $2.50; and three for $5, a discount of 25 per cent. being allowed from schedule rates. The oven costs, I think, $3. That would make the stove cost $6 net. By means of independent cocks one, two or three burners can be used as desired. The consumption of gas is very small. Those stoves assist very much in helping small gas companies to make sales of gas which otherwise they would not make. I have sold several of the Goodwin stoves. I think they give a discount of 33 or 35 per cent. There is a good deal in making an effort in this business. We have several families using gas stoves, and they say they find 500 to 800 feet per month answers their purpose very nicely. They are very convenient, for a person can get a very respectable meal in 15 minutes from time of lighting up. The ovens heat rapidly and nicely. To be sure there is not a fortune in introducing gas stoves, but in small works it sometimes happens that the men get absolutely rusty in trying to keep the works in operation—they do not make enough gas to keep them really busy; and that is one reason why I think it profitable to reduce gas rates and increase the output to such an extent that each retort house hand be kept steadily at work.

Mr. Christian—I wish to say a word on another branch of this subject which has been referred to—in regard to the candle power of the gas. I do not think that people demand cheap gas so much as they do high candle power gas. Especially in the large cities, I think they would be willing to pay more for 20 or 22 candle gas than for a 16 or 18 candle power article. The incandescent light giving the best satisfaction is rated at 20 candles. People are not satisfied with a 16 candle incandescent light because they say it is not so good as gas; but for the 20 candle incandescent many are willing to pay more than the same light from gas would cost. Although we want to keep the price of gas low, and have to do so on account of the competition which is in our business, we ought not to reduce the candle power of our gas, but rather to keep it up to the standard of at least 20 candles—at the same time it is, of course, more difficult to distribute 20 candle than 16 candle gas, because you have to make a perfect article; to see that the gas is purer, or that it is gas and not vapor, else you will have a great deal of trouble in this northern country from condensation. When you increase your candle power it seems to me it will be requisite to superheat the gas after it comes from out of the retort, in order to make a perfect gas, or one which will be non-condensable. You will also find it advantageous to do so because the gas, being whiter and more brilliant then, approaches closely in appearance to the high candle power incandescent light.

On motion of Mr. McMillin, a vote of thanks was passed to Mr. Wood.

*See JOURNAL, Vol. XXXVIII, June 16, 1883, p. 271.

(To be continued.)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
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MONDAY, APRIL 2, 1888.

The Market for Gas Securities.

The event of the fortnight was the scare in Consolidated gas, which culminated on the afternoon of Thursday, March 29. The stock opened on that day at 72, but free offerings speedily drove the price to 68½, which we think is about the lowest regularly recorded figure since these shares were listed. The day's transactions reached the large total of 3,573 shares, and there can be no blinking the fact that well-informed investors were liberal sellers. From the lowest notch quotations reacted to 69½, the last sale having been made at that rate. In the closing hour, 69½ was offered, sellers holding out for 69¼. Beyond a doubt the "scare" was in large part occasioned by the report that the Directors of the Company had determined to issue $3,000,000 bonds, but we have no official particulars regarding this action. The panic was accelerated by industriously circulated rumors of an impending war of rates, in which it was asserted the Equitable and Standard Companies would make common cause. Why the Equitable folks should made such an alliance it is hard to understand, unless their seeming prosperity during the last year or so was more apparent than real. The Consolidated Company has been quietly arming itself for some time back for a rupture of the sort now said to be reasonably assured, and we imagine, presupposing that armed neutrality is to be followed by open warfare, when settling time comes around Irving Place will have a word or two to say about the peace conditions. President Kennedy of the Mutual Company, according to the conditions of the loan, has notified the bondholders that the Trustees have designated by lot the numbers of the first mortgage bonds to be redeemed on and after the first of May, at which time interest on the drawn bonds will cease. The Union Trust Company, 71 Broadway, are to draw the checks.

Brooklyn shares are dull, but strong. The Boston situation shows no marked change, small lots of old Boston having changed hands between 1000 and 1050. Other Eastern shares are strong. Baltimore shares, on the likelihood of a fair settlement by the Legislature in regard to gas prices, are much firmer. Louisville gas advanced sharply in consequence of the renewal of the Company's charter.

Advertisers Index.

GAS ENGINEERS. Page
Jos. R. Thomas, New York City ... 240
Wm. Henry White, New York City ... 234
Wm. Mooney, New York City ... 240
William Gardner, Pittsburgh, Pa ... 240
Fred. Bredel, N. Y. City ... 239

GAS WORKS APPARATUS AND CONSTRUCTION.
James R. Floyd, New York City ... 243
T. F. Rowland, Greenpoint, L. I ... 243
Delly & Fowler, Phila., Pa ... 243
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 242
Stacey Mfg. Co., Cincinnati, Ohio ... 243
Bartlett, Hayward & Co., Baltimore, Md ... 233
Morris, Tasker & Co., Limited, Phila., Pa ... 242
Davis & Farnum Mf'g Co., Waltham, Mass ... 241
R. D. Wood & Co., Phila., Pa ... 242
Bouton Foundry Co., Chicago, Ills ... 243
Smith & Sayre Manufacturing Co., New York City ... 243
Fred. Bredel, N. Y. City ... 239
United Gas Improvement Co., Phila., Pa ... 231
Henry Pratt & Co., Chicago, Ill ... 228

PROCESSES.
National Gas Light and Fuel Co., Chicago, Ills ... 234
American Gas Improvement Co., Pittsburgh, Pa ... 234
Bartlett, Hayward & Co., Baltimore, Md ... 233
Wm. Henry White, N. Y. City ... 234
United Gas Improvement Co., Phila., Pa ... 231
Henry Pratt & Co., Chicago, Ill ... 228

GAS AND WATER PIPES.
Gloucester Iron Works, Phila., Pa ... 240
Mellert Foundry and Machine Co., Reading, Pa. (John Fox, Selling Agent, N. Y.) ... 240
Ohio Pipe Co., Columbus, Ohio ... 240
Pancoast & Rogers, New York City ... 240
M. J. Drummond, New York City ... 240
Wells Rustless Iron Co., New York City ... 240
R. D. Wood & Co., Phila., Pa ... 242

RETORTS AND FIREBRICK.
J. H. Gautier & Co., Jersey City, N. J ... 238
B. Kreischer & Sons, New York City ... 238
Adam Weber, New York City ... 238
Laclede Fire Brick Works, St. Louis, Mo ... 238
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 238
Borgner & O'Brien, Phila., Pa ... 238
James Gardner, Jr., Pittsburgh, Pa ... 238
Henry Maurer & Son, New York city ... 238
Chicago Retort and Fire Brick Co., Chicago, Ills ... 239
Baltimore Retort and Fire Brick Co., Baltimore ... 238
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo ... 238
Evens & Howard, St. Louis, Mo ... 239
Emil Lenz, New York City ... 239

SCRUBBERS AND CONDENSERS.
G. Shepard Page, New York City ... 232
R. D. Wood & Co., Phila., Pa ... 242

REGENERATIVE FURNACES.
Bartlett, Hayward & Co., Baltimore, Md ... 233
Fred. Bredel, New York City ... 239
Chicago Retort and Firebrick Co., Chicago, Ills ... 239
H. C. Hann, Baltimore, Md ... 229
Wm. Henry White, N. Y. City ... 234

GAS GOVERNORS.
T. C. Hopper, Phila., Pa ... 236
Connelly & Co., New York City ... 235

TAR AND CARBONIC ACID EXTRACTOR.
Geo. Shepard Page, N. Y. City ... 232

CEMENTS.
C. L. Gerould & Co., Brooklyn, N. Y ... 238
H. W. Johns Manufacturing Co., N. Y. City ... 229

GAS ENRICHERS.
Standard Oil Co., Cleveland, Ohio ... 244

GAS METERS.
Harris, Griffin & Co., Phila., Pa ... 246
American Meter Co., New York and Philadelphia ... 247
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 247
Helme & Mellhenny, Phila., Pa ... 247
D. McDonald & Co. Albany, N. Y ... 247
Nathaniel Tufts, Boston, Mass ... 246
Maryland Meter and Manufacturing Co., Baltimore, Md ... 246

EXHAUSTERS.
P. H. & F. M. Roots, Connersville, Ind ... 228
Smith & Sayre Manufacturing Co., New York City ... 243
Wilbraham Bros., Philadelphia, Pa ... 235
Connelly & Co., New York City ... 235

GAS COALS.
Penn Gas Coal Co., Phila., Pa ... 245
Perkins & Co., New York City ... 244
Newburgh Orrel Coal Co., Baltimore Md ... 245
Despard Coal Co., Baltimore, Md ... 245
Chesapeake and Ohio R.R. Coal Agency, N. Y. City ... 245
Westmoreland Coal Company, Phila., Pa ... 245
Monongahela & Peters Creek Gas Coal Co., Pittsburgh, Pa ... 245

CANNEL COALS.
Perkins & Co., New York City ... 244
J. & W. Wood, New York City ... 244

VALVES.
Ludlow Valve Manufacturing Co., Troy, N. Y ... 236
John McLean, New York City ... 236
Chapman Valve Manufacturing Co., Boston, Mass ... 235
R. D. Wood & Co., Phila., Pa ... 242

PURIFYING MATERIAL.
S. H. Douglas, Ann Arbor, Mich ... 239
Connelly & Co., New York City ... 235

GAS ENGINES.
Schleicher, Schumm & Co., Phila., Pa ... 204
Clerk Gas Engine Co., Phila., Pa ... 236

ENGINES AND BOILERS.
Jarvis Engineering Co., Boston, Mass ... 235

GAS LAMPS.
The Siemens-Lungren Co., Philadelphia, Pa ... 241
G. Shepard Page, New York City ... 236
Albo-Carbon Light Co., Newark, N. J ... 235
Standard Gas Lamp Co., Phila., Pa ... 228

PURIFIER SCREENS.
John Cabot, New York City ... 236
Geo. A. Mills, Baltimore, Md ... 236

GAS STOVES.
American Meter Co., New York and Philadelphia ... 237
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 248
Dinsmore Manufacturing Co., Boston, Mass ... 228

STREET LAMPS.
J. G. Miner, Morrisania, New York City ... 186
Bartlett Street Lamp Mf'g Co., New York City ... 229

BURNERS.
C. A. Gefrorer, Phila., Pa ... 244
Matchless Lighting Co., N. Y. City ... 227

STEAM BLOWER FOR BURNING BREESE.
H. E. Parson, New York City ... 192

GASHOLDER TANKS.
W. C. Whyte, New York City ... 242

GASHOLDER PAINT.
H. W. Johns Manufacturing Co., N. Y. City ... 229

COKE CRUSHER.
C. M. Keller, Columbus, Ind ... 245

ELECTRICAL APPARATUS.
Waterhouse Electric & Manufg Co., Hartford, Conn ... 229
Wm. Henry White, N. Y. City ... 234

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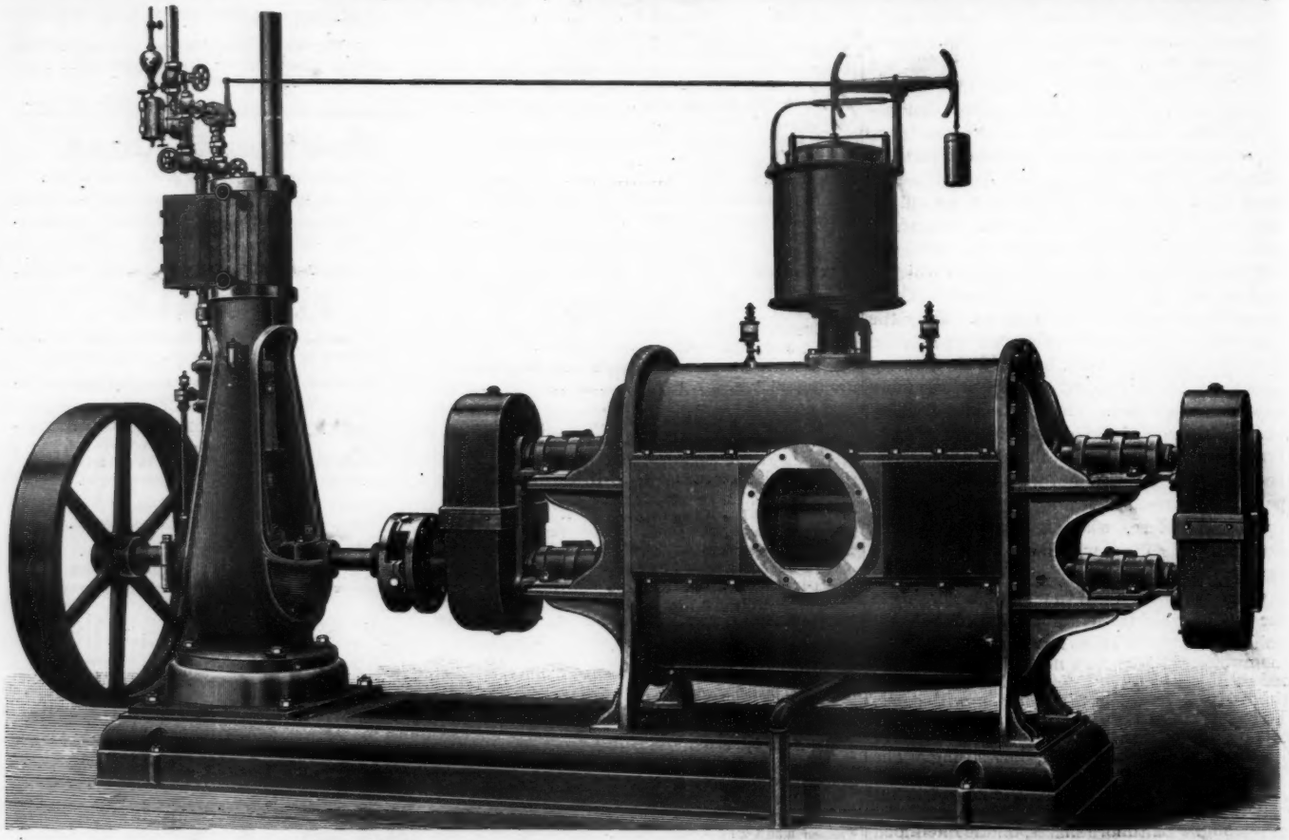

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Office Washington Gas Company, Washington, Daviess Co., Ind., Feb. 17, 1888.

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Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

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JOHN H. McELROY, Engineer.

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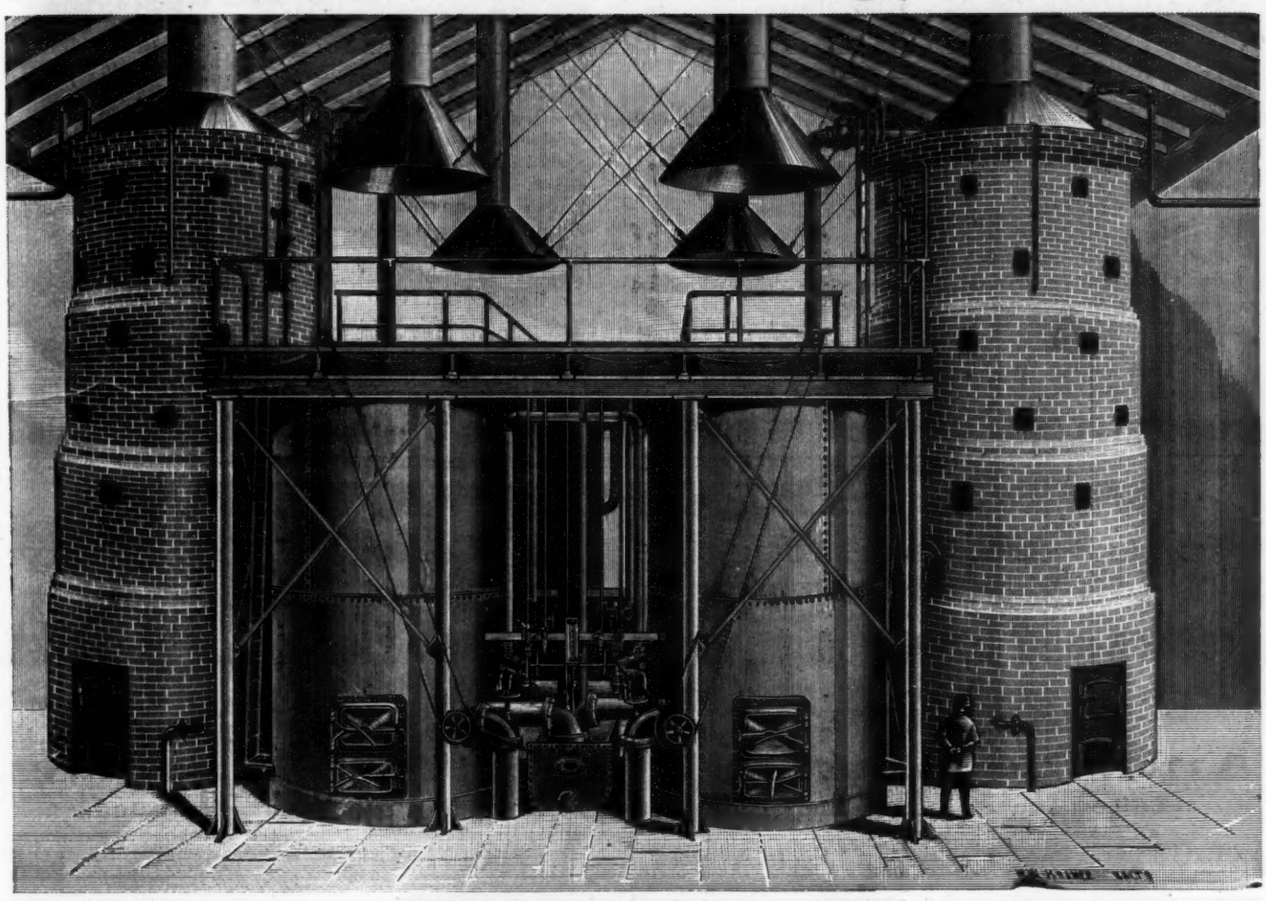

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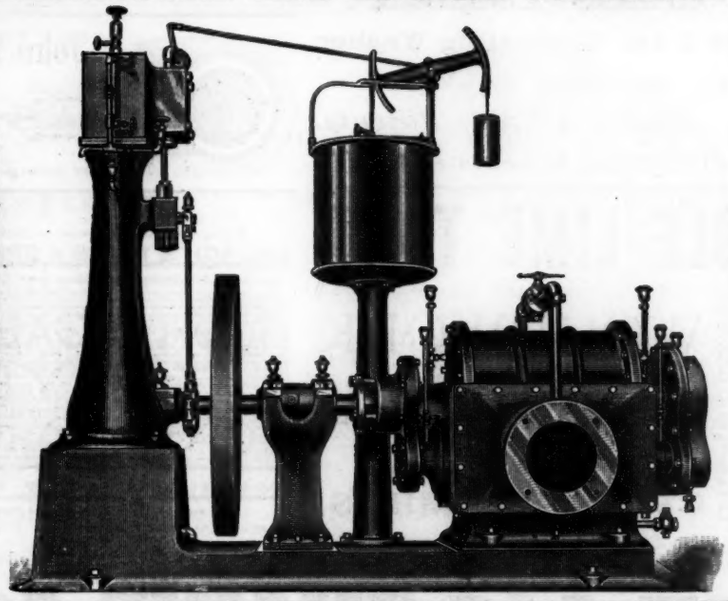

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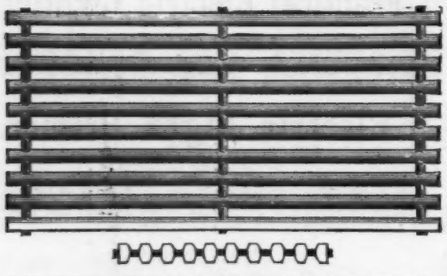

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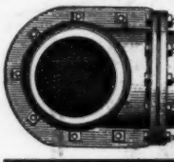

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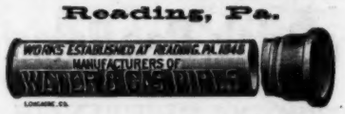

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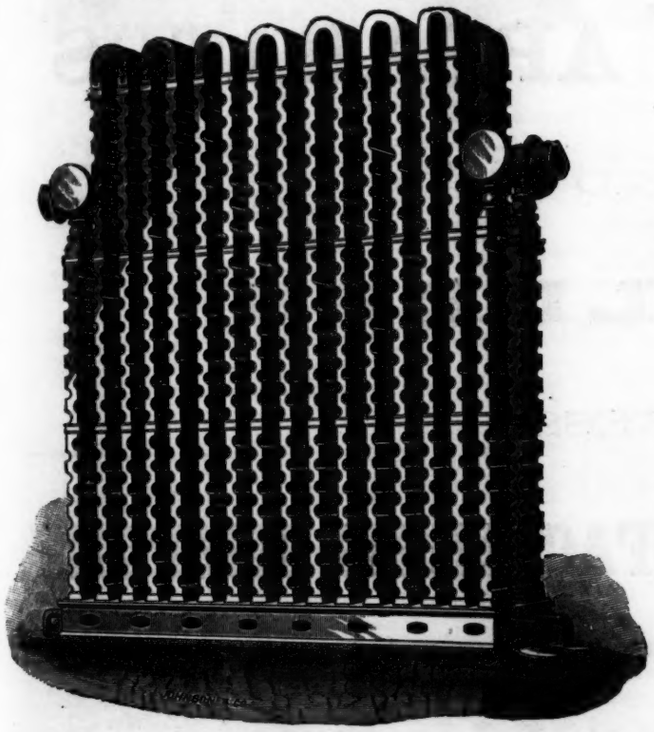

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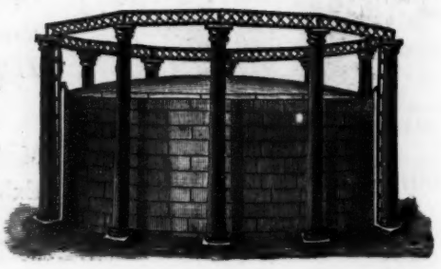

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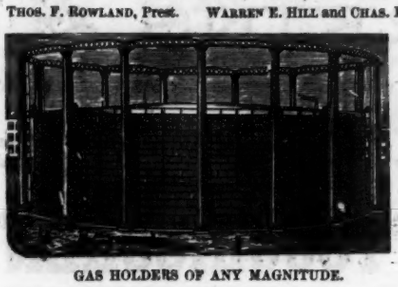
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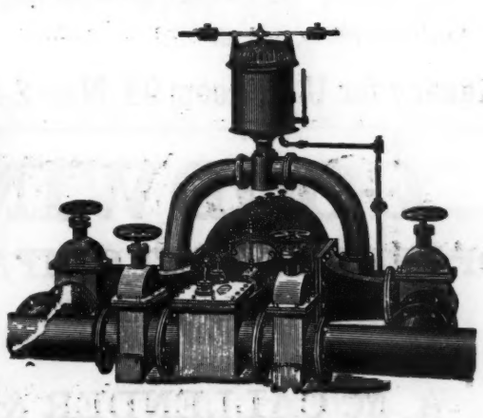

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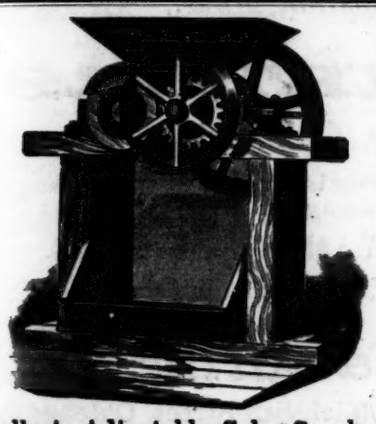

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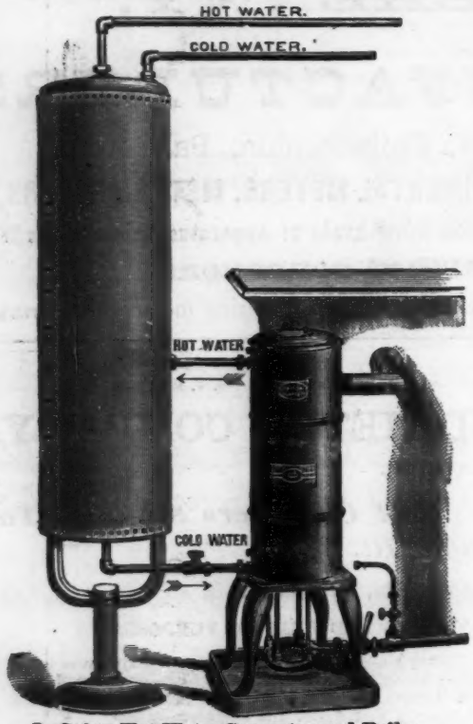

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